The economic consequences of accounting for derivatives

The Economic Consequences of Accounting for Derivatives

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Introduction

Over the last decade, the world has witnessed both a tremendous growth in the size of the derivative instruments market[1] and large losses associated with derivatives. Some well known firms associated with these losses include JPMorgan Chase, Gibson Greetings, Inc., Procter and Gamble Co., Orange County, and California (Rusinko and Mattews 1998; Dan and Julie 2012). The tremendous growth in the use of derivative instruments by a wide range of corporate and financial institutions, and reports of major losses associated with derivative instruments, have resulted in a great deal of concern about the complexity of these instruments and the lack of transparency with respect to risk exposures and hedging activities.

One of the main concerns of market participants is that the accounting standards for derivative instruments and hedging activities have not kept pace with the growth in the use and complexity of derivative instruments. Therefore, they have expressed their concern that the recognition and disclosure of derivative instruments and hedging activities does not provide adequate information about how it affects firm's financial position, operations, and cash flows (SFAS 133, paragraph 212 and 213). These concerns have inspired standard setters and regulators to deal expeditiously with reporting problems in derivative instruments and hedging activities. Because of the need for improved information, the Security and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB) issued a series of accounting standards in the 1990s.

Despite the issuing of these standards, the accounting guidance for derivative in-

[1] According to the Bank for International Settlements (BIS), the notional amounts outstanding in over-the-counter derivatives accelerated by 135% to $516 trillion from June 2004 to June 2007.

struments and hedging activities prior to the adoption of the Statement of Financial Accounting Standard No. 133 (SFAS 133) in 2000 remained incomplete and inconsistent (Zhang 2009). In response to the continuous call for improving the transparency of derivative instruments and hedging activities, the FASB issued the Statement of Financial Accounting Standard No. 133 (SFAS 133), *Accounting for Derivative Instruments and Hedging Activities*, that became effective as of June 15, 2000. SFAS 133 is the first comprehensive accounting standard for all derivative instruments and , arguably, it is also one of the most controversial standards ever issued by the FASB. Despite the controversy surrounding SFAS 133, relatively little is known about its costs and benefits.

Consequently, the purpose of this dissertation is to examine important questions surrounding derivative instruments recognition and disclosure under SFAS 133 that have not been addressed in the existing literature. The three studies of the dissertation provide new insights about the impact of derivative instruments recognition and disclosure under SFAS 133 on individual firms by examining the cross-sectional variation in the impact of SFAS 133 on information asymmetry among investors, investors' reactions to macro-economic news, and income smoothing. Chapters two and three examine the impact of SFAS 133 from the investors' perspective, while chapter four investigates the impact of SFAS 133 from the perspective of managers. More specifically, chapters two and three contain studies of the impact of derivative instruments recognition and disclosure under SFAS 133 on information asymmetry about the cash flow implications of changes in foreign exchange rates and investors' reactions to macro-economic news, respectively. The study in chapter four examines the impact of derivative instruments recognition and disclosure under SFAS 133 on income smoothing. The following section presents accounting standards for derivative instruments before and after SFAS 133 in more detail.

1.1 Background: Accounting for derivative instruments

Accounting for Derivative Instruments Prior to SFAS 133

Prior to SFAS 133, the accounting treatment of derivative instruments was governed by SFAS 52 and SFAS 80. SFAS 52, *Foreign Currency Translation*, specified the accounting treatment of derivative instruments related to foreign currencies (e.g., forward exchange contracts and currency swaps). SFAS 80, *Accounting for Future Contracts*, established the treatment of future contracts except foreign currency futures. Accounting for derivative instruments that were not specifically covered by SFAS 52 and SFAS 80 developed largely through practice and by analogy to these two standards. In general, if a derivative instrument was used for trading or speculative purposes, it was accounted for under speculative accounting, which requires

the derivative instrument be recognized at fair value on the balance sheet and any unrealized gains or losses be recognized in the income statement. On the other hand, if a derivative instrument was used to hedge the risk of existing assets, liabilities or forecasted transactions, the accounting treatment of the derivative instruments was determined by the accounting treatment of the hedged item. Specifically, the derivative instrument was recognized at fair value (historical cost) on the balance sheet as an asset or liability if the related asset or liability was also carried at fair value (historical cost). Gains or losses were incorporated into the carrying value of the assets or liabilities, or deferred and recorded at the same time earnings were recognized on the assets or liabilities.

To improve the clarity of derivative instruments disclosures, the FASB issued SFAS 105, SFAS 107, and SFAS 119 in the 1990s. SFAS 105, *Disclosure of Information about Financial Instruments with Off-Balance-Sheet Risk and Financial Instruments with Concentrations of Credit Risk*, required all entities to disclose the following information: a) notional principal amounts of financial instruments, b) the nature and terms of the instruments, c) the maximum accounting loss, d) the entity's policy for requiring collateral or other securities on financial instruments, and e) significant concentrations of credit risk. SFAS 107, *Disclosures about Fair Value of Financial Instruments*, extended the fair value disclosure practices for some instruments by requiring all entities to disclose the fair value of financial instruments. However, the statement failed to ensure adequate clarity in the presentation of fair values as it did not mandate separate disclosures for derivatives and other instruments. SFAS 119, *Disclosure about Derivative Financial Instruments and Fair Value of Financial Instruments*, extended SFAS 107 by requiring firms to clearly indicate whether the aggregate fair value of the derivative portfolio represented a net asset or a net liability position and to provide disaggregated information on carrying amounts, fair values, and contractual amounts of derivatives.

Taken together, prior to SFAS 133, accounting for derivatives was governed by SFAS 52 and SFAS 80, while disclosure was governed by SFAS 119.

Accounting for Derivative Instruments Under SFAS 133

Although the FASB issued SFAS 119, the accounting standards for derivatives remained incomplete and inconsistent (Zhang 2009). To improve the quality of derivative instruments and hedging activities reporting, the FASB issued SFAS 133, which became effective as of June 15, 2000. SFAS 133 requires firms to report all derivative instruments as either assets or liabilities on the balance sheet at fair value and recognize changes in the fair value of the derivative instruments in the income statement. For derivative instruments designated as hedging the exposure to changes in the fair value of a recognized asset or liability (i.e., fair value hedge), the gains or losses are recognized in earnings in the same accounting period as the offsetting gains or losses on the hedged item. For a derivative designated as hedging the exposure to

variable cash flows of a forecasted transaction (i.e., cash flow hedge), the effective portion of the derivative instrument's gains or losses is initially reported as a component of other comprehensive income (outside earnings) and subsequently reclassified into earnings when the forecasted transaction affects earnings. The ineffective portion of the gains or losses on the derivative instrument is reported in earnings immediately. For a derivative not designated as a hedging instrument (i.e., speculative hedge), the gains and losses are recognized in earnings in the period they occur. SFAS 133 allows firms to use hedge accounting only if certain criteria are met.[2] It also carried forward from SFAS 119 the requirements to disclose a description of the objectives, context, and strategies for holding or issuing derivatives. SFAS 133 also requires additional disclosures, such as the exposure to be hedged, hedging strategies for managing the associated risk, and any component of the derivatives' results that is excluded from the hedge effectiveness assessment.

In sum, SFAS 133 deals with controversial and critical issues, such as fair value accounting, hedge accounting, hedge effectiveness testing and measurement, documentation, and disclosure. In the appendix of the dissertation, I provide a sample of excerpts from SEC reports to illustrate derivative instruments recognition and disclosure under SFAS 133. The following sections provide a more detailed overview of each of the studies in this dissertation.

1.2 Accounting for derivatives and investors' uncertainty: The role of competition

The second chapter of this dissertation examines whether the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 provides useful information to investors and how the proprietary costs associated with derivative instruments and hedging activities affect the effectiveness of SFAS 133. It is based on the theoretical argument that market participants receive a signal that contains imprecise information about the firm's uncertain future cash flows, and decide whether to incur some cost to process the public information into private information. When firms disclose less precise public information about their uncertain future cash flow, the perceived benefits from costly information processing are likely to be higher. As a result, the information asymmetry among investors about the cash flow implications of a signal is likely to be higher.[3] Although SFAS 133 is a widely debated and controversial accounting standard for derivative instruments and hedging activities, it is likely to increase the transparency of the risks associated with derivative in-

[2] For example, the ratio of change in the value of hedged item and its hedging instruments should fall between 80% and 125% (SFAS 133).

[3] In this dissertation, investors' uncertainty refers to the information asymmetry among investors about the cash flow implications of changes in macro-economic news, such as foreign currency exchange rates. Thus, I use investors' uncertainty and information asymmetry among investors interchangeably.

struments and hedging activities by requiring that all derivatives be reported on the balance sheet at fair value. In addition, SFAS 133 reduces off-balance-sheet transactions and gives a more detailed picture of the risk situation to investors. However, firms that operate in competitive industries may strategically recognize and/or disclose information about their derivative instruments and hedging activities to protect their proprietary information. This will lead to an increase in the perceived benefits from costly information processing, and thus information asymmetry among investors will increase. In the light of this argument, I predict investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates to be lower after the implementation of SFAS 133. Moreover, I predict that the higher the level of product market competition, the weaker the decrease in investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates after the implementation of SFAS 133.[4]

These predictions are tested using a sample of US firms in the period from 1990 to 2009. One important finding from this chapter is that investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is lower after the implementation of SFAS 133, which implies that SFAS 133 has improved the transparency of the risks associated with derivative instruments and hedging activities, and thus has reduced information asymmetry among investors. The second major finding is that the higher the level of product market competition, the weaker the decrease in investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates after the implementation of SFAS 133. This indicates that firms that operate in more competitive industries strategically recognize and/or disclose information about their derivative instruments and hedging activities to protect their proprietary information so the effectiveness of SFAS 133 in reducing the information asymmetry among investors will be reduced. The results continue to hold under various robustness checks.

1.3 Investor responses to macro-economic news: The role of accounting recognition and disclosure

Chapter three addresses the question whether the quality of accounting recognition and disclosure affects investors' responses to macro-economic news. This chapter also addresses the question whether the level of underlying earnings volatility affects the impact of the quality of accounting recognition and disclosure on investors' responses to macro-economic news. More specifically, the chapter examines whether recognition and disclosure of derivative instruments and hedging activities under SFAS 133 affects investors' responses to good and bad interest rate news. Moreover, the chapter

[4] Although changes in market rates per se are not firm-specific signals, prior literature suggests that it has firm-specific implications because it is associated with equity returns and earnings (e.g., Linsmeier et al. 2002; Ahmed et al. 2006).

investigates whether the level of earnings volatility affects the impact of recognition and disclosure of derivative instruments and hedging activities under (SFAS 133) on investors' responses to good and bad interest rate news. This chapter is based on the premise that recognition and disclosure of derivative instruments and hedging activities under SFAS 133 affects investors' reactions to good and bad macro-economic news differently through its effect on quality of information. Because higher quality accounting recognition and disclosure decreases uncertainty about the precision of information that investors receive, I expect that investors react less asymmetrically to good and bad interest rates news after the implementation of SFAS 133 than before. Furthermore, because earnings volatility increases uncertainty about the precision of information, I expect that the asymmetry of responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher earnings volatility than for firms with lower earnings volatility. Lastly, because higher quality accounting information matters more for firms with higher earnings volatility than for firms with lower earnings volatility, I expect that the asymmetric responses to good and bad interest rates news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility.

These expectations are tested using a sample of US firms in the period from 1990 to 2009. The findings in this chapter provide evidence that confirms the expectations developed in this chapter, specifically, investors' responses are asymmetric to good and bad interest rate news. However, the asymmetry is less pronounced after the implementation SFAS 133. The findings also show that the asymmetry of responses to good and bad interest rate news before the adoption of SFAS 133 are greater for firms with higher earnings volatility than for firms with lower earnings volatility. Finally, the findings indicate that the decrease in the asymmetric responses to good and bad interest rate news after the implementation SFAS 133 are higher for firms with higher earnings volatility than for firms with lower earnings volatility. Overall, therefore, these findings confirm the idea that higher quality of accounting recognition and disclosure decreases uncertainty about the precision of information that investors receive, and thus they react less asymmetrically to good and bad macro-economic news. Moreover, information quality matters more when earnings volatility is higher. Additional robustness tests reinforce the evidence obtained in the main analysis.

1.4 The impact of accounting for derivatives on income smoothing

Chapter four of this dissertation investigates whether SFAS 133 affects corporate managers' income smoothing decisions. Prior to the adoption of SFAS 133, firms could hide ineffective hedges on the balance sheet by deferring the effects on the income statement. SFAS 133, however, exposes such hedges by requiring firms to recognize all ineffective hedges in the income statement immediately, but gains and

losses of the hedged item later. This mismatch may induce earnings volatility. Because earnings volatility is not preferred by shareholders and managers, managers have strong incentives to engage in income smoothing activities. Therefore, I predict firms' income smoothing activities to be higher after the adoption of SFAS 133. Moreover, because ineffective hedging and market instability will make it difficult for firms to qualify for hedge accounting, I predict that ineffective hedgers are more likely to engage in income smoothing than effective hedgers. I also predict that the higher the market instability, the higher the income smoothing after the adoption of SFAS 133.

The predictions of this chapter are tested using a sample of US firms in the period from 1992 to 2006. My sample begins in 1992 because this was the first year that executive compensation data became available on Compustat, and ends in 2006 because it enhances comparability with prior studies.[5] The findings confirm that firms engage in more income smoothing activities after the implementation of SFAS 133 to mitigate the undesirable consequences of earnings volatility imposed by SFAS 133. The results also show that ineffective hedgers engage in more income smoothing activities than effective hedgers. Finally, the results indicate that the higher the level of market instability, the higher income smoothing after the adoption of SFAS 133. These results continue to hold under various robustness checks.

1.5 Contribution

The findings of chapter two add to a growing body of literature on the impact of product market competition on firms' accounting recognition and disclosure decisions. First, the study contributes to the literature by providing empirical evidence that the higher the level of product market competition, the weaker the impact of recognition and disclosure of derivative instruments and hedging activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. This indicates that the proprietary costs associated with firms' derivative instruments and hedging activities vary across firms[6] and that these differential costs affect firms' recognition and disclosure decisions. Second, this study provides insights into whether the adoption of SFAS 133 is effective in reducing information asymmetry among equity investors. The findings indicate that SFAS 133 indeed decreases such information asymmetry, which implies that it has improved the transparency about the risks associated with derivative instruments and hedging activities. Third, this study helps standard setters and regulators to take market forces into account before deciding whether recognition and/or disclosure of forward-looking accounting information should be mandatory for all firms.

[5] In the sensitivity test, I extended the sample period from 2006 to 2009 and find results consistent with my main findings.

[6] These proprietary costs may be hedging strategy and position, managers hedging skills, the types of exposures, volume of derivative contracts, and anticipated cash flows.

The findings of the second study make several contributions to the current literature. First, this study contributes to the existing literature by providing empirical evidence that the asymmetric responses of investors to good and bad interest rate news is less pronounced after the implementation of SFAS 133. Second, this study contributes to the literature by documenting that the decreases in the asymmetric responses to good and bad interest rate news after the implementation of SFAS 133 is higher for firms with higher earnings volatility than for firms with lower earnings volatility, which implies that when earnings volatility is higher, information quality is more of a concern to investors to better predict future cash flows. Third, this study provides additional evidence with respect to whether recognition is a substitute for disclosure. Consistent with Ahmed et al. (2006), the findings suggest that this is not the case.

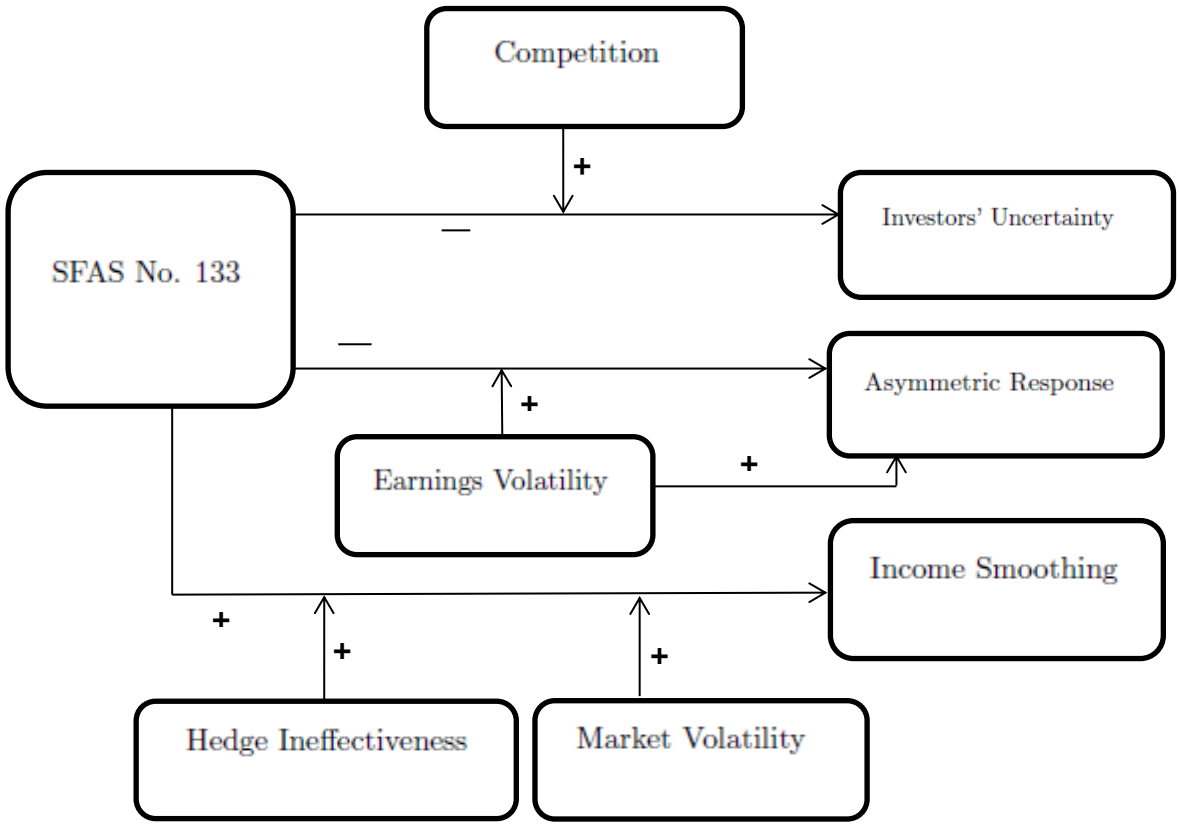
The third study contributes firstly to the general debate about whether SFAS 133 affects earnings volatility by providing empirical evidence that SFAS 133 induces pre-managed earnings volatility. Secondly, this study contributes to the literature by showing that the degree of hedge ineffectiveness and market instability affect the impact of SFAS 133 on income smoothing. Thirdly, this study confirms previous findings and presents additional evidence that managers use more discretionary accruals to smooth earnings after the implementation of SFAS 133. Finally, this study encourages standard setters and regulators to consider the trade-off between increased transparency and income smoothing.

1.6 Outline of the dissertation

Each of the following chapters presents one of the three aforementioned studies in detail. Chapter two investigates the influence of product market competition on the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. Chapter three considers the role of the quality of accounting recognition and disclosure on investor reactions to macro-economic news. Chapter four focuses on the impact of SFAS 133 on firms' income smoothing activities. Chapter five summarizes the main findings of all three studies, discusses their implications and limitations, and provides suggestions for future research. Figure 1 summarizes the studies in this dissertation. Specifically, it shows, first the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates, and the influence of product market competition on the impact of SFAS 133 on investors' uncertainty (i.e., the first study). Second, it shows the role of SFAS 133 on investors' reactions to macro-economic news, the impact of earnings volatility on investors' reactions to macro-economic news, and the role of SFAS 133 on investors' reactions to macro-economic news (i.e., the second study). Third, it shows the impact of SFAS 133 on firms' income smoothing activities, and the influence of hedge ineffectiveness and market volatility on the impact of SFAS 133 on firms' in-

come smoothing activities (i.e., the third study). Finally, it shows the predicted signs of the hypothesized relationships.

Figure 1: A graphical display of the studies in this dissertation



2

Accounting for derivatives and investors' uncertainty: The role of competition

2.1 Introduction

Statement of Financial Accounting Standards No. 133 (SFAS 133), *Accounting for Derivative Instruments and Hedging Activities*, requires firms to report all derivative instruments on the balance sheet at fair value and recognize unrealized gains and losses due to changes in fair value in the income statement and/or as a component of other comprehensive income. One of the main purposes of SFAS 133 is to improve the transparency of the risks (e.g., foreign currency exchange rates risk exposure) associated with derivative instruments and hedging activities. In SFAS 133 (paragraph 238), the FASB states:

> *Statement of Financial Accounting Standard No. 133 increases the visibility, comparability, and understandability of the risks associated with derivative instruments by requiring that all derivative instruments be reported as assets or liabilities and measured at fair value.*

In addition to pressure from the regulatory bodies, market mechanisms such as product market competition also play a role in shaping firms' accounting recognition and disclosure decisions. Although prior studies have documented the benefits

of expanded voluntary disclosure, there is limited empirical research on the effectiveness of accounting recognition and disclosure regulation (e.g., Healy and Palepu 2001). Moreover, the existing literature on the effect of product market competition on firms' accounting recognition and disclosure decisions has mainly focused on voluntary disclosure and mandatory segment reporting settings (e.g., Harris 1998; Verrecchia and Weber 2006; Li 2010). Thus, the purposes of this study are first, to investigate whether changes to the accounting recognition and disclosure requirements for derivative instruments and hedging activities mandated by SFAS 133 are effective in providing useful information to investors. Second, it examines whether product market competition affects the effectiveness of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133. More specifically, it investigates whether the adoption of SFAS 133 has an impact on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. This study also examines whether product market competition plays a role in the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates.

The empirical evidence of this study is important for the following reasons. First, the introduction of recognition and disclosure for derivatives and hedging activities under SFAS 133 has generated intense controversy over its potential benefits and costs. In particular, proponents of SFAS 133 argue that the standard provides useful information to investors by requiring firms to report all derivative instruments on the balance sheet at fair value and to report changes in fair value in the income statement and/or as a component of other comprehensive income (e.g., Ahmed et al. 2011). In contrast, opponents of SFAS 133 argue that the standard will not provide useful information to investors because firms may not properly report the fair value of derivatives, especially for items not traded on public exchanges (Penman 2011). Moreover, they claim, SFAS 133 will unintentionally lead some firms to strategically recognize and/or disclose their derivatives instruments and hedging activities to protect their proprietary information (Kawaller 2004). Thus, detailed analysis of the costs and benefits of SFAS 133 is necessary.

Second, although previous studies provide useful insights into the relevance of risk disclosure (Venkatachalam 1996; Barth et al. 1996; Schrand 1997), there are few studies that examine the effectiveness of SFAS 133 (e.g., Ahmed et al. 2011). These studies, however, did not examine the existence of variation in the propriety costs associated with derivative instruments and hedging activities, or the impact of SFAS 133 on information asymmetry among equity investors. This study thus takes a first step to fill the evident gaps in the literature on the effectiveness of SFAS 133, and the impact of product market competition on the effectiveness of SFAS 133.

Theoretical studies on firms' accounting recognition and disclosure decisions suggest that when the proprietary costs associated with information recognition and disclosure is higher, firms are less likely to disclose information voluntarily, even if it

increases costs to raise additional capital (Healy and Palepu 2001; Verrecchia 1983). From a mandatory disclosure perspective, Dye (1985) argues that when proprietary costs exist in mandatory accounting recognition and disclosure, firms will strategically recognize and/or disclose their forward-looking information.

Managers are concerned about SFAS 133 because it forces firms to reveal proprietary information that competitors may exploit. There is anecdotal evidence that this concern is relevant to managers. For instance, Kawaller (2004) argues that firm managers may be hesitant to be fully transparent about their exposure and how hedges are managed for fear that it could be used by the competitors. As Wolfe, the chairman and CEO of Hershey Foods, phrases it:

> *Derivative instruments recognition and disclosure, as required by SFAS 133, could indeed force Hershey to reveal proprietary information about its hedging strategies to its competitors, which would be extremely harmful to Hersheys ability to conduct its business.*[1]

This view supports the claim that there are proprietary costs associated with the recognition and disclosure of derivative instruments and hedging activities under SFAS 133. These costs are likely to be higher for firms that operate in competitive industries, who may therefore strategically recognize and/or disclose their derivative instruments and hedging activities after the implementation of SFAS 133.[2]

Following Kim and Verrecchia's (1994) theoretical model that some market participants decide to incur some costs to process imprecise public information into private information and diverge the implication of the common observed signal, I argue that the strategic recognition and/or disclosure of derivative instruments and related activities after the adoption of SFAS 133 increases the perceived benefits from costly information processing for any given level of change in foreign currency exchange rates. Thus, some market participants can obtain information advantage by engaging in costly information processing.

In this study, I assume that the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 provides useful information to investors because SFAS 133 gives greater uniformity in accounting for derivative instruments and hedging activities and standardizes the requirements to qualify for hedge accounting. Thus, I expect investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates to be lower after the implementation of SFAS 133. I also expect that the higher the level of product market competition, the weaker the effectiveness of SFAS 133 in reducing investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates.

[1] http://banking.senet.gov/97-10hrg/100997/witness/wolfe.htm.

[2] For instance, SFAS 133 does not require firms to disclose the location of their derivative gains or losses on the income statement. This gives discretion to managers to classify them in any of several line items.

To test my hypotheses, I measure investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates by using the estimated coefficient from a regression of the bid-ask spreads on the absolute value of the percentage change in the Federal Reserve Board trade-weighted U.S. dollar index. Consistent with prior studies, I employ bid-ask spreads as a proxy for information asymmetry, which is measured as the difference between the bid and ask price (i.e., bid-ask spread) divided by the midpoint (Leuz and Verrecchia, 2000; Daske et al., 2008; Cuijpers and Peek 2010). To capture the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates, I create an indicator variable that takes the value of one for fiscal years ending after the adoption of SFAS 133 and zero otherwise. Like prior studies (e.g., Karuna 2007), I use different measures to capture different dimensions of product market competition: product substitutability, market size, and entry costs. Greater product substitutability, larger market size, and lower entry costs indicate more intense product market competition, given the level of concentration.

Analyzing a sample of 92,393 firm-year observations from 1990 to 2009, I find that investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is lower after the adoption of SFAS 133. This indicates that the recognition and disclosure of derivative instruments and hedging activities under SFAS 133, on average, decreases the perceived benefits from engaging in costly information processing, and thus informed traders lose some of their information advantage. This is consistent with Amhed et al. (2011), who find that SFAS 133 has improved the transparency and monitoring of the risk implications of derivative instruments to bond investors. I also find that the higher the level of product market competition, the weaker the impact of SFAS 133 on information asymmetry among investors about the cash flow implications of changes in foreign currency exchange rates. This indicates that SFAS 133 indeed unintentionally forces firms that operate in competitive industries to strategically recognize and/or disclose their derivative instruments and hedging activities to protect their proprietary information. This creates an opportunity for some investors to incur some costs to process public information into private information and divert the implication of the common observed signal. It also supports the existence of variation in the propriety costs associated with SFAS 133 reporting. My results remain robust with an alternative measure of product market competition, an alternative specification and with the inclusion of transition period observations.

This study contributes to the literature in several ways. First, prior studies on the effectiveness of SFAS 133 implicitly assume that the propriety costs associated with SFAS 133 reporting is the same across firms, and thus that derivative instruments and hedging activities recognition and disclosure decisions do not vary across firms or industries (e.g., Ahmed et al. 2011). The findings of this study, however, show that there is variation in the propriety costs associated with the recognition and

disclosure of derivative instruments and hedging activities under SFAS 133. Thus, it extends prior studies by providing empirical evidence that the higher the level of product market competition, the weaker the impact of the recognition and disclosure of derivative instruments and related activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. Second, prior studies focus on the association between product market competition and firms' segment reporting decisions (e.g., Harris 1998). This study extends these prior segment reporting studies by focusing on the impact of product market competition on firms' derivative instruments and related activities reporting decisions. The results suggest that the higher the level of product market competition, the higher the proprietary costs associated with the recognition and disclosure of derivative instruments and hedging activities. Thus firms that operate in more competitive industries are more likely to strategically recognize and/or disclose their derivative instruments and hedging activities than firms that operate in less competitive industries. Third, this study helps standard setters and regulators to take market forces (e.g., product market competition) into account before deciding whether forward-looking accounting information recognition and/or disclosure should be mandatory for all firms. Fourth, this study provides insights into whether the adoption of SFAS 133 is effective in reducing investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. Despite the controversy over the usefulness of SFAS 133, only a few studies have examined its relevance to investors. Thus, this study improves our understanding of the implications of SFAS 133 adoption. Finally, this study contributes to the limited empirical research on the effect of accounting recognition and disclosure regulations (Healy and Palepu 2001).

The remainder of the study is organized as follows. In the next section, I review previous studies. Section 2.3 describes the theory and develops the hypotheses. Section 2.4 presents the research design. Section 2.5 discusses sample selection procedures and descriptive statistics. The results of my analyses are presented in section 2.6, while section 2.7 provides a brief summary and conclusion.

2.2 Literature review

There are two streams of literature that pertain to this study. The first stream of literature investigates the association between product market competition and firms' segment reporting decisions. The second stream of literature concerns the relevance of the recognition and disclosure of derivative instruments to equity and bond investors.

Prior studies on the association between product market competition and firms' segment reporting decisions indicate that firms operating in less competitive industries are less willing to disclose detailed information about their segments. Harris (1998) undertakes an empirical investigation of the association between the level of product market competition and managers' choices of which operations to report as

business segments. She hypothesizes that firms operating in less competitive industries will disclose less information to protect proprietary information from potential competitors. Using a sample of 929 multi-segment firms, she find that companies are indeed less likely to disclose segments separately in less competitive industries. Her result suggest that the proprietary costs associated with segment reporting discourage detailed segment reporting.

In line with Harris (1998), Botosan and Stanford (2005) examine managers' incentives for withholding segment information for a sample of 615 U.S. companies. They find that, when reporting under SFAS 14, U.S. companies hide profitable segments operating in less competitive industries. Their results thus suggest that firms operating in less competitive industries may withhold segment information to protect profits, thereby mitigating the proprietary costs of disclosure.

Tsakumis et al. (2006) undertake an empirical investigation of why some firms provide more detailed geographical area information under SFAS 131 than others. Employing a sample of 115 Fortune 500 firms, they tested whether firms operating in competitive industries provide less detail in their geographic area disclosures. Consistent with Harris (1998) and Botosan and Stanford (2005), they find that firms expecting greater proprietary costs associated with geographical area information provide a lower level of detailed geographic disclosure.

Similarly, Nichols and Street (2007) extended prior studies to non-U.S. companies and examined the association between product market competition and business segment disclosures under the International Accounting Standard (IAS) 14. For a sample of 160 non-U.S. companies that report financial statements according to the International Accounting Standards, they find a significant negative association between disclosure and company returns in excess of the industry average. Their findings suggest that flexibility in segment determination persists as IAS 14's management approach continues to allow managers to aggregate industry segments to protect proprietary information in less competitive industries.

Other studies, however, indicate that firms provide less information disclosure in the presence of rivals (Verrecchia 1983; Verrecchia 1990; Verrecchia and Weber 2006). For example, Verrecchia and Weber (2006) investigated firms' decisions to report proprietary information from their material contracts filings, and find that firms operating in competitive industries are less likely to disclose information they deem proprietary. Thus, firms respond to the higher level of product market competition by providing less information.

Taken together, these findings suggest that the expected relationship between firms' voluntary disclosure decisions and the level of product market competition depends on whether the information being disclosed provides profitability information that would attract new competitors to a currently non-competitive market or provides strategic information to current competitors in a currently competitive market.

The second stream of literature examines the sensitivity of stock prices to for-

eign currency exchange rates and the relevance of the recognition and disclosure of derivative instruments to equity and bond investors. Empirical work by Jorion (1990) examines the association between changes in the value of the U.S dollar and changes in value of the firms as measured by stock prices for U.S. multinationals. He finds a positive association between stock returns and changes in foreign currency exchange rates. The results imply that changes in foreign currency exchange rates are priced so that firms can manage their exposures to foreign currency exchange rates. Bartov and Gordon (1994) reexamine the relation between contemporaneous and lagged changes in the value of the U.S. dollar and abnormal stock performance. Employing a sample of U.S firms with sufficiently large foreign currency adjustments reported on their past annual financial statements over the period of 1978 to 1989, they find no correlation between abnormal returns and contemporaneous changes in the dollar (i.e., contemporaneous dollar fluctuation have little power in explaining abnormal stock returns). However, they find that a lagged change in the value of the dollar is a significant variable in explaining abnormal returns. This suggests that a complete market response to the impact of past changes in the dollar value is delayed until information about the past performance of the firm is disseminated.

In related empirical work, Wong (2000) examines whether there is an association between foreign currency exposure and quantitative disclosures about the notional amount and fair value of foreign currency exchange derivatives under SFAS 119. Using a sample of 145 Fortune 500 manufacturing firms during 1994 to 1996, he finds a weak association between currency exposure and derivatives disclosures, which implies that derivatives disclosure under SFAS 119 does not help to predict future foreign currency exchange exposure.

Two studies that are particularly related to this study are Ahmed et al. (2011) and Linsmeier et al. (2002). Ahmed et al. (2011) examine the relevance of the recognition and disclosure of derivative instruments under SFAS 133 to bond investors. For the largest 25 banks, they find that interest rate derivatives classified as hedging are more negatively associated with fixed-rate bond spreads after the adoption of SFAS 133. This result implies that derivative instruments recognition and disclosure is beneficial to bond investors. Linsmeier et al. (2002) investigate the effects of market risk disclosures under Financial Reporting Release 48 (FRR 48) on trading volume sensitivity to market rates or prices using a sample of nonfinancial firms. They posit that firms' market risk disclosure mandated by the SEC reduces investors' uncertainty and diversity of opinion about changes in market rates or prices. The reduction in investors' uncertainty and diversity of opinion should dampen trading volume sensitivity to changes in underlying market rates or prices. Consistent with their expectations, they find that after the disclosure of FRR 48 information, trading volume sensitivity to changes in market rates or prices declines.

Although prior studies provide useful insights, there are very few studies that examine the usefulness of risk disclosure in general and the recognition and disclosure

of derivative instruments and hedging activities under SFAS 133 in particular. This study fills the evident gap in the literature by examining the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates, and by investigating the impact of product market competition on this influence.

2.3 Theory and hypotheses

2.3.1 SFAS 133 and investors' uncertainty

Voluntary disclosure theory suggests that higher quality financial reporting and better disclosures should reduce adverse selection problems in the capital market and mitigate the information asymmetry problem by leveling the playing field for all investors (Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Verrecchia 2001; Lambert et al., 2007). These studies show that public disclosures reduce the information asymmetry that prevailed in the pre-disclosure period between informed and uninformed investors. However, some studies argue that public information disclosure may also create a new information asymmetry in the market since some investors have better information-processing abilities (Indjejikian 1991; Kim and Verrecchias 1994). In this study, I use Kim and Verrecchia's (1994) theoretical model to develop my conceptual framework.

Kim and Verrecchia's (1994) theoretical model relaxes investors' homogeneity by allowing differential information-processing abilities. The model shows how market participants receive a signal that contains imprecise information about its uncertain future cash flows, and decide whether to incur some cost to process the public information into private information. Some market participants may engage in costly information processing because the future cash flow implications of the signal are subject to interpretation. This gives an opportunity for certain market participants to make decisions that are superior to the decisions of other market participants. Consequently, there may be more information asymmetry after information disclosure than before. However, if the perceived benefits from information processing is lower than the processing costs, then market participants will not engage in costly information processing. Linsmeier et al. (2002) argue that when firms disclose less precise public information about uncertain future cash flows, the perceived benefits from information processing are likely to increase. As a result, the number of investors willing to engage in costly information processing is likely to increase. This will lead to an increase in information asymmetry among investors about the cash flow implications of a signal.

Following the above line of argument, when market participants learn of underlying changes in foreign currency exchange rates, they will engage in costly information processing to determine the firm-specific cash flow implications of changes in these

rates if the benefit from information processing is higher than the processing costs.

Proponents of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 argue that the standard increases the visibility and comparability of the risks associated with derivatives by requiring that all derivative instruments be reported on the balance sheet at fair value. It also reduces off-balance-sheet transactions and gives a more detailed picture of the risk situation. Moreover, SFAS 133 reduces the inconsistency and incompleteness of applying previous accounting standards by providing comprehensive guidance for all derivatives and hedging activities (e.g., Ahmed et al. 2011)

However, critics of SFAS 133 claim that the standard provides little or no useful additional information to investors, for the following reasons. First, companies may not accurately report fair value on derivative instruments, especially for items not traded on public exchanges. This introduces additional uncertainty regarding the true market value of derivatives because mark to market accounting gives management discretion to potentially manipulate the books (Penman, 2011). Second, SFAS 133 could introduce additional volatility in earnings and owners equity (Sapra 2002). Finally, SFAS 133 could reveal proprietary information that could be used by competitors and market participants, putting the disclosing entity at a competitive disadvantage (Kawaller 2004). According to these arguments, derivative instruments and hedging activities reporting under SFAS 133 may not provide additional useful information for investors.

In sum, the direction of the effect of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is unclear. To empirically assess this effect, I analyze the impact of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. Although SFAS 133 is a widely debated and controversial accounting standard, I assume that, prior to SFAS 133 adoption, the firm-specific cash flow implications of changes in the underlying foreign currency exchange rates tended to be imprecise, for the following reasons. First, prior to the adoption of SFAS 133, the accounting treatment for derivative instruments and hedging activities was incomplete and inconsistent (e.g., Zhang 2009). Second, most derivative contracts were off-balance-sheet items, lacking transparency. Third, as Wong (2000) finds there is only a weak association between SFAS 119 disclosure and foreign currency exposure, which implies that SFAS 119 disclosure does not help to predict future foreign currency exposure.[3]

Following Kim and Verrecchia's (1994) model, I expect that the number of investors who decide to incur additional processing costs to convert public infirmation into private information decreases after the implementation of SFAS 133. I specifi-

[3]SFAS 119 is the most recent accounting standard for derivatives instruments and hedging activities prior to the adoption of SFAS 133.

cally predict that investors' uncertainty about the cash flow implications of foreign currency exchange rates is lower after the implementation of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133. Hence, I formulate the following hypothesis:

H1: Investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is lower after the implementation of SFAS 133.

2.3.2 SFAS 133, investors' uncertainty, and competition

A large stream of literature that examines the benefits of higher quality financial reporting and better disclosure suggests that full voluntary disclosure arises as long as it is costless to do so (Healy and Palepu 2001). However, in deciding how much information to disclose, firms face a trade-off between the benefits and costs of revealing proprietary information. Proprietary costs theory suggests that proprietary costs associated with information disclosure limits full voluntary disclosure decisions (Verrecchia 1983; Darrough 1993; Healy and Palepu 2001).[4] The theory is based on the assumption that, in the absence of these costs, firms have incentives to voluntarily disclose relevant information to the market in order to reduce adverse selection problems and, consequently, the cost of capital (Verrecchia 1983; Diamond 1985; Darrough 1993). Verrecchia (1983) predicts that the higher the propriety costs associated with information disclosure, the less information firms will voluntarily disclose, even if it makes it more costly to raise additional capital. According to Verrecchia (1983), firms should protect their competitive advantage by hiding proprietary information. When proprietary costs exist in mandatory disclosure requirements, firms will strategically recognize and/or disclose their forward-looking information (Dye 1985) and/or decrease voluntary risk disclosures (Bagnoli and Watts 2007).

One of concerns of managers' about the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 is that the standard forces firms to reveal proprietary information that competitors may exploit. For instance, Kawaller (2004) shows that firm managers may be hesitant to be more transparent about revealing their risk exposure (e.g., exchange rates risk exposure), how much of this exposure is covered and how hedges are managed, for fear that it could be used by the firm's competitors. This fear may also serve as the rationale for why firms oppose regulation that increases transparency about their hedging strategy.

Similar to the concerns of the CEO of Hershey Foods (quoted in the introduction), General Motors described its concern as follows:

> *If GM disclosed the volume of its derivative contracts and their anticipated cash flows, a competitor could calculate the purchase price of GMs*

[4] Other costs, such as costs of preparing and disseminating information, may also limit firm's full voluntary disclosure decisions.

components.

Consequently, the anecdotal evidence supports the claim that there are proprietary costs associated with the recognition and disclosure of derivative instruments and hedging activities under SFAS 133, and that these differential costs affect managers' derivative instruments and hedging activities recognition and/or disclosure decisions.

Given the anecdotal evidence, I expect that the proprietary costs associated with derivative instruments and hedging activities reporting under SFAS 133 increase with the level of product market competition. That is, firms operating in competitive industries are more likely to strategically recognize and/or disclose their derivative instruments and hedging activities, and SFAS 133 may also crowd out voluntary risk disclosure. This creates an opportunity for some investors to engage in costly information processing and divert the common signal into private information because it will increase the perceived benefits from costly information processing. Applying the Kim and Verrecchia (1994) model, I specifically predict that the higher the level of product market competition, the weaker the negative association between investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates and the post-SFAS 133 period indicator variable. Hence, I formulate the following hypothesis:

H2: The higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates.

2.4 Research design

2.4.1 Variable measurement

Dependent variable: Investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates

I measure investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates (hereafter IU) as the estimated coefficient of a regression of the bid-ask spreads on the absolute value of the percentage change in the value of the Federal Reserve Board trade-weighted U.S. dollar index.[5] Investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is estimated over a nine-month period, starting three months after the year end, when the derivative instruments information is disclosed.[6] I estimate firm-year specific

[5]I examine the absolute value of foreign currency rate change because I expect both positive and negative movements of a given magnitude to generate similar perceived information-processing opportunities.

[6]I specified a nine-month post-disclosure observation window for two reasons. First, my objective is to detect possible long-term effects of the recognition and disclosure of derivative instruments

investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates using weekly data. The model is specified as follows[7]:

$$Spread = \alpha_0 + \alpha_1 absDXR + \alpha_2 absDIR + \alpha_3 logret + \alpha_4 volume + \alpha_5 logprice + \epsilon \tag{2.1}$$

Spread is my information asymmetry proxy, measured as the weekly closing bid-ask price differences (i.e., bid-ask spreads), expressed as a percentage of the weekly closing bid-ask price average; absDXR is the absolute value of the weekly percentage change in the Federal Reserve Board trade-weighted U.S. dollar index; absDIR is the absolute value of the weekly percentage change in the value of the short-term (three-month Treasury bill) interest rate. Following prior studies (e.g., Linsmeier et al. 2002), I control for return volatility (logret) measured as the natural logarithm of the standard deviation of weekly returns. I also control for trading volume (volume) measured as the weekly shares traded scaled by shares outstanding, and I control for closing stock prices (logprice) measured as the natural logarithm of the weekly closing stock price.

The value of the estimated coefficient on absDXR (i.e., α_1) captures investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates (Δ Spread /Δ absDXR). I use α_1 as a dependent variable (i.e., IU) in my regression analyses.

Explanatory variables

My primary explanatory variables are an indicator variable that captures whether the fiscal year is in the post-SFAS 133 adoption period, and interaction variables between the indicator variable and product market competition measures. The indicator variable takes the value one for fiscal years ending after the adoption of SFAS 133, and zero otherwise.

Measures of product market competition

Prior studies have employed different measures to capture product market competition (e.g., Karuna 2007). Conventionally, industry concentration ratios such as Herfindahl-Hirschman Index (HHI) or the four-firm concentration ratio have been

and hedging activities under SFAS 133 on bid-ask spreads in order to provide insights into the consequences of SFAS 133. Second, prior research (e.g., Wong 2000) has used a nine-month window and thus my use of it enhances comparability with prior studies.

[7]To estimate this equation, I use the Generalized Method of Moments (GMM) with the heteroskedasticity and autocorrelation consistent (HAC) standard errors (Newey-West standard errors) option to correct for heteroscedasticity and autocorrelation (Wooldridge 2002). The PROC MODEL procedure with the GMM estimation in the FIT statement and KERNEL option in the SAS statistical software package provides this flexibility.

used as measures of product market competition (e.g., Harris 1998). However, recent studies suggest that product market competition is multidimensional and cannot be captured only by the Herfindahl-Hirschman Index or the four-firm concentration ratio (e.g., Karuna 2007). These studies suggest that market size, product substitutability, and entry costs better capture the different dimensions of product market competition, given the concentration ratio. These studies further suggest that concentration is a poor proxy for product market competition, as the association between concentration and competition is unclear (e.g., Karuna 2007).

Therefore, in line with Karuna (2007), I measure product market competition along three dimensions: market size, entry costs, and product substitutability. Like Karuna (2007), I obtain industry-level data at the primary four-digit SIC code level to construct the product market competition measures. I measure market size (MKTSIZE) as the natural logarithm of industry sales (at the four-digit SIC code level). It reflects market demand and the density of consumers in an industry. MKTSIZE is likely to be positively associated with product market competition, as large market demand attracts new entrants. I measure entry costs (ENTCOST) as the natural logarithm of the weighted average gross value of the cost of property, plant and equipment for firms for which this is the primary industry (at the four-digit SIC code level), weighted by each firm's market share in this industry.[8] It captures the average level of investment that must be incurred by each entrant firm to a particular industry. The higher the amount of investment required, the higher the barrier to enter an industry. Thus, ENTCOST is likely to be negatively associated with product market competition. I measure product substitutability (DIFF) as the price-cost margin estimated by the natural logarithm of industry sales divided by industry operating costs (at the four-digit SIC code level). It measures the extent of product substitutability in an industry. The higher the value of DIFF (i.e., the lower the level of product substitutability), the lower the level of product market competition. Finally, I measure the concentration ratio (CONC) by using the industry sales concentration ratio of the four largest firms in the particular industry. I calculate the four-firm concentration ratio as follows:

$$\text{Four-firm concentration ratio} = \sum_{i=1}^{4}(s_{ij}/S_j)$$

where s_{ij} is firm i's sales in industry j. S_j is the sum of sales s_i for all firms in industry j, and s_i/S_j is firm i's market share in industry j.

Control variables

Following prior research (e.g., Leuz and Verrecchia 2000; Karuna 2007; Daske et al., 2008), I include several control variables that are expected to influence bid-ask

[8] I obtain market share by dividing the segment sales figure for the primary industry segment of a firm by the sum of the segment sales of all firms that have this primary industry as their primary sale.

spreads and/or product market competition. I control for firm size (FIRM-SIZE) because disclosure level (costs of disclosure) increases (decreases) with firm size (Welker 1995). I measure FIRM-SIZE as the natural logarithm of the market value of equity. I control for growth opportunities (BTM) because firms with higher growth opportunities disclose more information than firms with lower growth opportunities. I measure BTM as a ratio of firms' book value to market value of equity. I control for firm profitability (ROA) because prior studies show that capital market incentives induce more profitable firms to disclose more information (Hayes and Lundholm 1996; Healy et al., 1999). I measure ROA as the ratio of net income to total assets. I control for stock price synchronicity (SYNCH) because an increase in stock price synchronicity will decrease adverse selection risk, resulting in a decline in information asymmetry. Following prior studies (e.g., Morck et al., 2000), I measure SYNCH as the natural logarithm of $[R^2/(1\text{-}R^2)]$ where R^2 is the coefficient of determination estimated by regressing company's returns on the market returns. I control for time trend (TIMEY), measured as the rank of the financial reporting dates. I control for leverage (LEV) because prior studies show leverage and bid-ask spreads are negatively associated. I measure LEV as the ratio of total liabilities to total assets. I control for the average spreads (AS) in the market using the value of the intercept estimated in model 2.1. Following prior studies (e.g., Bryan and Stanley 2009), I expect a positive association between investors' uncertainty and average spread. Because I expect positive (negative) associations between spreads and changes in foreign currency exchange rates to be more positive (more negative) when AS increases, I use two AS variables (ASP and ASN). I define ASP as the value of the intercept estimated in model 2.1 if the association is positive and zero otherwise. I define ASN as the value of the intercept (α_0) estimated in model 2.1 if the association is negative and zero otherwise. Finally, I include foreign currency exchange rates risk exposure estimates to control for foreign currency exchange rates risk exposure. I estimate firm-year specific firms' foreign currency exchange rates risk exposure using weekly data. Following prior studies (e.g., Choi and Elyasiani 1997), I use the next model to estimate foreign currency exchange rates risk exposure[9]:

$$logret = \beta_0 + \beta_1 XR + \beta_2 IR + \beta_3 logiret + \epsilon \quad (2.2)$$

where logret is the natural logarithm of weekly returns; XR is the weekly percentage change in the Federal Reserve Board trade-weighted U.S. dollar index; IR is the weekly percentage change in short-term (three-month Treasury bill) interest rate, and logiret is the natural logarithm of weekly market return. The coefficient on XR

[9]To estimate this equation, I use the Generalized Method of Moments (GMM) with the heteroskedasticity and autocorrelation consistent (HAC) standard errors (Newey-West standard errors) option to correct for heteroscedasticity and autocorrelation (Wooldridge 2002). The PROC MODEL procedure with the GMM estimation in the FIT statement and KERNEL option in the SAS statistical software package provides this flexibility.

(i.e, β_1) captures the foreign currency exchange rates risk exposure (XREX). Because I expect positive (negative) associations between spreads and changes in foreign currency exchange rates to be more positive (more negative) when XREX increases, I use two control variables (XREXP and XREXN) in my regression analyses. I define XREXP as the value of foreign currency exchange rates risk exposure coefficient (i.e, β_1) estimated in model 2.2 if the association is positive and zero otherwise. I define XREXN as the value of foreign currency exchange rates exposure coefficient (i.e, β_1) estimated in model 2.2 if the association is negative and zero otherwise.

2.4.2 Hypotheses test

SFAS 133 and investors' uncertainty

To test whether investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates changes significantly from the pre-SFAS 133 period to the post-SFAS 133 period (i.e., to test hypotheses 1), I use the following regression equation:

$$IU = \gamma_0 + \gamma_1 POST + \gamma_2 SIZE + \gamma_3 BTM + \gamma_4 ROA + \gamma_5 LEV + \gamma_6 SYNCH + \gamma_7 TIMEY + \gamma_8 ASP + \gamma_9 ASN + \gamma_{10} XREXP + \gamma_{11} XREXN + \omega \quad (2.3)$$

All variables are defined as before (see also Appendix 2).

The coefficient of interest in equation (2.3) is γ_1. This essentially measures the shift in investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates from the pre-SFAS 133 to the post-SFAS 133 period. Given my assumption that the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 increases the precision of investors' assessments of the cash flow implications of changes in foreign currency exchange rates and decreases the diversity of opinion in information processors assessments, I expect γ_1 to be negative and significant.

SFAS 133, investors' uncertainty and competition

In the second part of the study, I examine the influence of the level of product market competition on the effect of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates (i.e., hypothesis 2). To test hypothesis 2, I estimate the following regression equation:

$$IU = \Theta_0 + \Theta_1 POST + \Theta_2 MKTSIZE + \Theta_3 POST * MKTSIZE + \Theta_4 DIFF + \Theta_5 POST * DIFF + \Theta_6 ENTCOST + \Theta_7 POST * ENTCOST + \Theta_8 CONC + \Theta_9 POST * CON + \Theta_{10} SIZE + \Theta_{11} BTM + \Theta_{12} ROA + \Theta_{13} LEV + \Theta_{14} SYNCH + \Theta_{15} TIMEY + \Theta_{16} ASP + \Theta_{17} ASN + \Theta_{18} XREXP + \Theta_{19} XREXN + \lambda \quad (2.4)$$

All variables are defined as before (see also Appendix 2).

The coefficients of interest in equation (2.4) are Θ_3, Θ_5, and Θ_7. Because I posit that the higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates, I expect Θ_3, Θ_5, and Θ_7 to be positive, negative and negative, respectively.

I employ two different regression models to test equation 2.3 and 2.4. The first is an OLS regression. I also use a second regression model. This second model is fixed-effects model, where I include firm dummies in the regressions. This allows me to control for unobserved firm effects (fixed effects) on investors' uncertainty about the cash flow implications of changes in exchange rates that are assumed to be constant through time but vary across firms (Wooldridge 2002).

2.5 Sample selection and descriptive statistics

2.5.1 Sample selection and data sources

The sample used in this study covers firms in the U.S with fiscal years ending on or after January 15, 1990 through December 31, 2009. Following prior studies (e.g., Ahmed et al., 2006), I designate fiscal years ending prior to 15 December 2000 as the pre-SFAS 133 period, periods ending after 15 December 2001 as the post-SFAS 133 period, and between December 15, 2000 and December 15, 2001 as the transition period. I start in 1990 and end in 2009 to ensure that the sample period before and after SFAS 133 is sufficiently long. I exclude the transition period from the analysis to avoid any temporary changes caused by SFAS 133 adoption.

Data required to estimate my equations come from different sources. I obtained data on share prices, shares outstanding, and stock returns from the Center for Research in Security Prices (CRSP) database. I acquired data on sales, net income (loss), gross value of the cost of property, plant and equipment, total assets, and total stockholders' equity from the Compustat North America database. I obtained data about underlying market rates from the U.S. Federal Reserve database.

To mitigate the influence of outliers, all variables were winsorized at the 0.5 and 99.5 percentiles. I deleted observations with missing values. The final sample con-

sists of 92,392 firm-year observations in 48 industries over the period 1990 to 2009. Table 2.1 shows the composition of the sample by industry.

Table 2.1: *Composition of Sample by Industry**

Industry-type	No. of firm-year	Percent	Industry-type	No. of firm-year	Percent
BusSv	9152	12.04	Books	690	0.91
Rtail	3889	5.12	ElcEq	803	1.06
Chips	4914	6.47	Cnstr	879	1.16
Enrgy	3171	4.177	Txtls	398	0.52
Drugs	4259	5.60	Fun	1252	1.65
Mach	2681	3.53	PerSv	744	0.98
Insur	2305	3.03	Misc	658	0.87
Comps	3610	4.75	Toys	774	1.02
Chems	1446	1.90	Aero	311	0.41
Whlsl	3155	4.15	Rubber	689	0.91
Trans	2099	2.76	Banks	849	1.12
Steel	1116	1.47	Gold	550	0.72
Paper	1133	1.49	Boxes	214	0.28
MedEq	2687	3.54	Beer	298	0.39
Food	1228	1.62	Mines	298	0.39
BldMt	1398	1.84	Soda	195	0.26
Meals	1504	1.98	FabPr	301	0.40
Hshld	1336	1.76	Guns	94	0.16
Autos	1080	1.42	Agriculture	246	0.32
Telcm	2590	3.41	Smoke	125	0.15
Util	4643	3.84	Ships	157	0.21
LabEq	1780	2.34	Coal	112	0.13
Fin	2619	3.45	RlEst	640	0.84
Clths	1154	1.52	Total	92,392	100.00
Hlth	1489	1.96			

*I use the Fama and French 48 industry classification.

2.5.2 Descriptive statistics

Table 2.2 reports descriptive statistics for the variables used in this study, which show that investors' uncertainty about the cash flow implications of changes in exchange rates is positive on average. The means and medians of MKTSIZE, ENTCOST, DIFF, and CONC are generally comparable to statistics documented in prior studies (e.g., Karuna 2007). The small difference between the means and the medians indicates that the variables used in this study are not highly skewed.

Table 2.2: *Descriptive Statistics for Variables Used in Regression Analyses*

Variables	N	Minimum	Mean	Median	Std	Maximum
IU	92,393	-2.451	0.017	0.004	0.450	2.539
POST	92,393	0.000	0.391	0.000	0.488	1.000
MKTSIZE	92,393	3.830	9.876	9.984	1.932	13.763
DIFF	92,393	-0.392	0.135	0.107	0.140	0.861
ENTCOST	92,393	0.009	6.438	6.624	2.295	11.346
CONC	92,393	0.006	0.197	0.124	0.205	1,000
SIZE	92,393	0.060	5.205	5.047	2.195	13.139
BTM	92,393	-1.531	0.636	0.481	0.682	4.895
ROA	92,393	-2.075	-0.052	0.028	0.293	0.417
LEV	92,393	0.000	0.225	0.179	0.222	1.137
SYNCH	92,393	-12.134	-3.115	-2.679	2.237	0.590
TIMEY	92,393	1.000	9.852	9.000	5.252	20.000
ASP	92,393	-0.212	0.035	0.000	0.080	0.562
ASN	92,393	-0.188	0.033	0.000	0.080	0.574
XREXP	92,393	0.000	0.580	0.092	1.014	6.784
XREXN	92,393	0.000	0.511	0.000	1.001	6.830

The table reports descriptive statistics for the variables used in the regression analyses. All variables are defined as before (see also Appendix 2).

Table 2.3 reports correlations of the key variables used in the regression analyses. Pearson correlations are presented above the diagonal and Spearman rank correlations are presented below the diagonal. IU and POST are negatively correlated, as reflected by both Spearman and Pearson correlations, as expected. I find a moderately high positive correlation between MKTSIZE and ENTCOST, which indicates that firms in greater demand industries also invest more heavily in plant, machinery, and buildings. I also find a moderately high negative correlation between MKTSIZE and CONC, which suggests that higher demand in an industry or market attracts new firms to the industry or market, which leads to a decrease in concentration in that industry.

Table 2.3: *Correlations between Variables used in Regression Analyses*

Variables		*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*
IU	A		-0.027***	0.008***	0.000	0.005	-0.007**	-0.005	-0.012***	-0.008**	0.001	0.008**	0.009***	0.710***	-0.716***	0.820***	-0.836***
POST	B	-0.013***		0.254***	0.105***	0.278***	0.038***	0.275***	-0.009***	-0.009***	-0.058***	0.340***	0.846***	-0.198***	-0.178***	-0.013***	-0.041***
MKTSIZE	C	0.000	0.248***		0.257***	0.717***	-0.628***	0.284***	-0.059***	-0.041***	-0.053***	0.202***	0.306***	-0.063***	-0.079***	0.019***	-0.033***
DIFF	D	-0.002	-0.074***	0.213***		0.218***	0.134***	-0.103***	0.085***	-0.005	0.077***	0.136***	-0.039***	-0.044***	-0.002	-0.023***	-0,021***
ENTCOST	E	0.004	0.270***	0.700***	0.057***		-0.307***	0.339***	-0.041***	0.066***	0.019***	-0.039***	0.041***	-0.006***	0.008***	-0.011***	0.009***
CONC	F	-0.002	0.034***	-0.588***	-0.154***	-0.294***		-0.105***	0.041***	0.066***	0.019***	-0.039***	0.041***	-0.006***	0.008**	-0.011***	0.009***
SIZE	G	-0.005	0.273***	0.316***	0.086***	0.365***	-0.077***		-0.291***	0.351***	0.035***	0.566***	0.336***	-0.141***	-0.164***	-0.024***	-0.089***
BTM	H	-0.010***	-0.012***	-0.068***	-0.017***	-0.066***	0.036***	-0.309***		-0.101***	0.043***	-0.175***	-0.044***	0.032***	0.046***	-0.035***	0.006*
ROA	I	-0.007**	-0.020***	-0.033***	0.074***	-0.015***	0.057***	0.280***	0.067***		-0.144***	0.182***	0.008***	-0.048***	-0.061***	-0.048***	-0.060
LEV	J	0.005	-0.040***	-0.037***	0.047***	0.019***	0.029***	-0.001	-0.042***	-0.055***		-0.026***	-0.062***	0.012***	0.013***	-0.008***	0.002
SYNCH	K	-0.002	0.297***	0.186***	0.032***	0.207***	-0.037***	0.486***	-0.157***	0.117***	-0.039***		0.375***	-0.103***	-0.136***	0.009***	-0.075***
TIMEY	L	0.009***	0.869***	0.298***	0.090***	0.321***	0.037***	0.334***	-0.044***	-0.009***	-0.044***	0.333***		-0.178***	-0.194***	0.033***	-0.050***
ASP	M	0.367***	-0.247***	-0.115***	-0.031***	-0.123***	0.011***	-0.211***	0.072***	-0.004	0.038***	-0.164***	-0.249***		-0.550***	0.687***	-0.679***
ASM	N	-0.405***	-0.234	-0.123***	-0.031***	-0.126***	0.017***	-0.230***	0.088***	-0.021***	0.037***	-0.170***	-0.254***	-0.184***		-0.692***	0.742
XREXP	O	0.041***	-0.061***	-0.002	-0.026***	-0.009***	-0.016***	-0.122***	-0.008***	-0.153***	0.022***	-0.052***	-0.012***	0.273***	-0.238***		0.854***
XREXM	P	-0.402***	-0.069***	-0.038***	-0.032***	-0.044***	0.002	-0.155***	0.017***	-0.153***	0.027***	-0.089***	-0.047***	-0.225***	0.321***	-0.292***	

The table reports the values of the correlation between variables used in the regression analyses. Spearman (Pearson) correlations are above (below) the diagonal. All variables are defined as before (see also Appendix). ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

2.6 Main results

In this section, I present my empirical findings. First, I report results on the effect of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. Then, I discuss my findings about the influence of the level of product market competition on the effect of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates.

2.6.1 SFAS 133 and investors' uncertainty

Table 2.4 presents the regression results for equation (2.3), investigating the changes in investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates after the adoption of SFAS 133. The results indicate that this affects investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. Column I of Table 2.4 provides the results conducted based on equation (2.3). The estimated coefficient on POST is negative and significant (γ_1 = -0.0506; t = -10.03). After including firm dummies in the regression (firm-fixed-effects regression), the results reported in Column II of Table 2.4 show that the estimated coefficient on POST is still negative and significant (γ_1 = -0.0307; t = -6.07). The results indicate that investors' uncertainty about the cash flow implications of changes in exchange rates is lower after the implementation of the recognition and disclosure of derivative instruments and hedging activities under SFAS 133.

The coefficients on the control variables are generally consistent with my predictions. For example, the negative coefficients on ROA and SYNCH suggest that investors' uncertainty about changes in exchange rate decreases as the firm's performance and the quality of information environment increases. Moreover, the positive coefficient on TIMEY indicates that investors' uncertainty about changes in exchange rates increases over time. This suggests that the significant decline in investors' uncertainty about changes in exchange rate after the implementation of SFAS 133 is not due to a trend but to the adoption of SFAS 133.

Overall, the results in Table 2.4 provide evidence supporting my first hypothesis that investors' uncertainty about the cash flow implications of changes in foreign currency rates is lower in the post-SFAS 133 period than the pre-SFAS 133 period, which indicates that SFAS 133 indeed increases the visibility, comparability, and understandability of the risks associated with derivative instruments and hedging activities.

Table 2.4: *SFAS 133 and Investors' Uncertainty*

Variables	Predicted sign	I	II
POST	-	-0.0506***	-0.0307***
		(-10.03)	(-6.07)
SIZE	-	0.0052***	-0.0047**
		(-7.21)	(-2.41)
BTM	-	-0.0023	-0.0047*
		(-1.23)	(-1.74)
ROA	-	-0.0068	-0.0065
		(-1.54)	(-1.03)
LEV	-	-0.0144***	0.0081
		(-2.67)	(0.84)
SYNCH	-	-0.0014**	-0.0009
		(-2.24)	(-1.39)
TIMEY	±	0.0038***	0.0019***
		(8.15)	(3.54)
ASP	+	1.1436***	1.1644***
		(67.74)	(60.14)
ASN	-	-1.4376***	-1.5101***
		(-83.86)	(-76.21)
XREXP	+	0.0949***	0.0707***
		(71.88)	(46.88)
XREXN	-	-0.0984***	-0.0781***
		(-72.95)	(-50.51)
INTERCEPT	±	0.0213***	
		(3.39)	
Firm-fixed-effects			Yes
Observations		92,392	92,392
R^2		35%	49%

The table reports the regression coefficient estimates and (in parentheses) t-statistics. Firm-fixed-effects are included in the regression reported in column II of the table. All variables are as defined before (see also Appendix 2). ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

2.6.2 SFAS 133, investors' uncertainty, and competition

Table 2.5 reports the regression results for equation (2.4), examining the influence of product market competition on the effect of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. The results presented in Column I of Table 2.5 show that the estimated coefficient on MKTSIZE*POST is positive and significant ($\Theta_3 = 0.0058$; t = 2.59), which indicates that the larger the market size, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. The estimated coefficient on DIFF*POST is negative and significant (Θ_5 = -0.0266; t =

-1.84), which implies that the greater the product substitutability, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. The estimated coefficient on ENTCOST*POST is negative and significant (Θ_7 = -0.0038; t = -2.59), which implies that the lower the entry cost, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. After including firm dummies in the regression (firm-fixed-effects regression), the results reported in Column II of Table 2.5 show that the estimated coefficient on POST*MKTSIZE is positive and significant (Θ_3 = 0.0064; t = 2.31), POST*DIFF is negative and significant (Θ_5 = -0.0380; t = -1.68) and POST*ENTCOST is negative and significant (Θ_7 = -0.0032; t = -1.66). These results continue to suggest that the higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. Although I made no prediction regarding the main effects of MKTSIZE, DIFF, and ENTCOST, the results show that MKTSIZE, DIFF, and ENTCOST have a significant negative, positive, and positive association with investors' uncertainty about the cash flow implications of changes in exchange rates, respectively, suggesting that the association between product market competition and investors' uncertainty is negative before the implementation of SFAS 133.

To provide further evidence on the impact of SFAS 133 on investors' uncertainty for different levels of product market competition, I next compute the coefficient on POST for different levels of competition (i.e., competition at the lowest, median, and highest levels). To compute the coefficient, I use the following equation:

$$\frac{\partial IU}{\partial POST} = -0.0813 + 0.0064 * MKTSIZE - 0.038 * DIFF - 0.0032 * ENTCOST \tag{2.5}$$

Using the results of the fixed effects model reported in table 2.5, an analysis of equation 2.5 at the lowest competition values for the variables MKTSIZE, DIFF, and ENTCOST gives:

$$\frac{\partial IU}{\partial POST} = -0.0813 + 0.0064 * 3.83 - 0.038 * 0.861 - 0.0032 * 11.346 = -0.126 (t = -4.44).$$

An analysis of equation 2.5 at the median competition values for the variables MKTSIZE, DIFF, and ENTCOST gives:

$$\frac{\partial IU}{\partial POST} = -0.0813 + 0.0064 * 9.984 - 0.038 * 0.107 - 0.0032 * 6.624 = -0.043 (t = -2.23).$$

And an analysis of equation 2.5 at the highest competition values for the variables MKTSIZE, DIFF, and ENTCOST gives:

$$\frac{\partial IU}{\partial POST} = -0.0813+0.0064*13.763-0.038*-0.392-0.0032*0.009 = 0.022(t = 0.46).$$

The findings suggest that product market competition decreases the impact of derivative and hedging activities recognition and disclosure under SFAS 133 on investor's uncertainty about the cash flow implications of changes in exchange rates. More specifically, the significant coefficient on POST at the lowest competition values for the variables MKTSIZE, DIFF, and ENTCOST (i.e., -0.126; t =-4.44) indicates that SFAS 133 indeed has an impact on investors' uncertainty for firms in low competitive industries. The significant coefficient on POST at the median competition values for the variables MKTSIZE, DIFF, and ENTCOST (i.e., -0.043; t =-2.23) also shows that for the median firms the SFAS 133 has an impact on investors' uncertainty. However, the insignificant coefficient on POST at the highest competition values for the variables MKTSIZE, DIFF, and ENTCOST (i.e., 0.022; t = 0.46) indicates that SFAS 133 has no impact on investors' uncertainty for firms in highly competitive industries. The results imply that regulators need to be a aware of the impact of competition when designing regulations.

Table 2.5: *SFAS 133, Product Market Competition, and Investors' Uncertainty*

Variables	Predicted sign	I	II
POST	-	-0.0819***	-0.0813***
		(-3.96)	(-3.28)
MKTSIZE	±	-0.0059***	-0.0096***
		(-3.96)	(-4.25)
POST*MKTSIZE	+	0.0058***	0.0064**
		(2.59)	(2.31)
DIFF	±	0.0027*	0.0342*
		(1.73)	(1.81)
POST*DIFF	-	-0.0266*	-0.0380*
		(-1.84)	(-1.68)
ENTCOST	±	0.0033***	0.0035**
		(3.46)	(2.41)
POST*ENTCOST	-	-0.0038***	-0.0032*
		(-2.591)	(-1.66)
CONC	±	-0.0085	-0.0303**
		(-0.89)	(-2.13)
POST*CONC	±	-0.0005	0.0107
		(-0.03)	(0.57)
SIZE	-	-0.0005***	-0.0057***
		(-6.66)	(-2.87)
BTM	-	-0.0023	0.0011
		(-1.23)	(0.48)
ROA	-	-0.0071	-0.0133**
		(-1.59)	(-2.15)
LEV	-	0.0133**	0.0060
		(2.46)	(0.61)
SYNCH	-	-0.0014**	-0.0009
		(-2.17)	(-1.34)
TIMEY	±	0.0042***	0.0026***
		(8.59)	(4.57)
ASP	+	1.1429***	1.0853***
		(67.64)	(59.22)
ASN	-	-1.4382***	-1.4633***
		(-83.83)	(-77.73)
XREXP	+	0.0950***	0.0891***
		(71.59)	(61.74)

(This table is continued on the next page)

Table 2.5 (Continued)

Variables	Predicted sign	I	II
XREXN	-	-0.0983***	-0.0957***
		(-72.88)	(-65.35)
INTERCEPT	±	0.0567***	
		(4.62)	
Firm-fixed-effects			Yes
Observations		92,392	92,392
R^2		35%	50%

The table reports regression coefficient estimates and (in parentheses) t-statistics. Firm-fixed-effects are included in the regression reported in column II of the table. All variables are defined as before (see also Appendix 2). ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

In sum, the results presented in Table 2.5 support my second hypothesis, that the higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates, which implies that the proprietary costs associated with derivative instruments and hedging activities increase as the level of competition increases, and thus firms that strategically recognize and/or disclose these information to protect their proprietary information.

2.6.3 Sensitivity tests

I conducted a number of additional analyses to test the robustness of my findings. First, I investigated whether taking into account the observations from the transition period affects my results. I find similar results after including observations from the transition period in my analyses (untabulated).

Secondly, I examined whether my results are sensitive for changes in the transition period. Using a fiscal year between 1999 and 2001 as a new transition period, I find consistent results with my main findings. Specifically, the results reported in Column I of Table 2.6 show that the coefficient on POST is negative and significant (γ_1 = -0.0384; t = -7.48). After including firm dummies in the regression, the results reported in Column II of Table 2.6 show that the estimated coefficient on POST is still negative and significant (γ_1 = -0.0293; t = -5.42).

The results reported in Column III of Table 2.6 show that the estimated coefficient on POST*MKTSIZE is positive and significant (Θ_3 = 0.0060; t = 2.65), POST*DIFF is negative and significant (Θ_5 = -0.0282; t = -1.58) and POST*ENTCOST is negative and significant (Θ_7 = -0.0038; t = -2.42). After including firm dummies in the regression, the results reported in Column IV of Table 2.6 show that the estimated coefficient on POST*MKTSIZE is positive and significant (Θ_3 = 0.0069; t = 2.50), POST*DIFF is negative and significant (Θ_5 = -0.0433; t = -1.91) and POST*ENTCOST is negative and significant (Θ_7 = -0.0036; t = -1.85). Overall, the results shown in Table

2.6 are similar to those shown in Table 2.4 and Table 2.5.

Table 2.6: *SFAS 133, Product Market Competition, and Investors' Uncertainty : 1999 to 2001 as a transition period*

Variables	Predicted sign	I	II	III	IV
POST	-	-0.0384***	-0,0293***	-0.0723***	-0.0742***
		(-7.48)	(-5.42)	(-3.51)	(-2.99)
MKTSIZE	±			-0.0061***	-0.0097***
				(-4.46)	(-4.27)
POST*MKTSIZE	+			0.0060***	0.0069**
				(2.65)	(2.50)
DIFF	±			0.0109	0.0471**
				(0.92)	(2.47)
POST*DIFF	-			-0.0282*	-0.0433*
				(-1.58)	(-1.91)
ENTCOST	±			0.0033***	0.0037**
				(3.43)	(2.55)
POST*ENTCOST	-			-0.0038**	-0.0036*
				(-2.42)	(-1.85)
CONC	±			-0.0125	-0.0357**
				(-1.29)	(-2.50)
POST*CONC	±			0.0055	0.0197
				(0.36)	(1.04)
SIZE	-	-0.0046***	-0.0056***	-0.0044***	-0.0054***
		(-6.38)	(-2.83)	(0.36)	(-2.75)
BTM	-	-0.004388**	-0.0057**	-0.0043**	-0.0050**
		(-2.30)	(-2.09)	(-2.30)	(-2.07)
ROA	-	-0.0068	-0.0086	-0.0072*	-0.0092
		(-1.56)	(-1.35)	(-1.61)	(-1.44)
LEV	-	0.0127**	-0.0004	0.0116**	0.0001
		(2.36)	(-0.04)	(2.16)	(0.08)
SYNCH	-	-0.0014**	-0.0009	-0.0014**	-0.0001
		(-2.27)	(-1.35)	(-2.23)	(-1.33)
TIMEY	±	0.0028***	0.0015	0.0031***	0.0021***
		(5.85)	(2.78)	(6.33)	(3.43)
ASP	+	1.1548***	1.0967***	1.1542***	1.0964***
		(68.14)	(59.41)	(68.05)	(59.40)
ASN	-	-1.4306***	-1.4545***	-1.4313***	-1.4556***
		(-83.50)	(-77.23)	(-83.47)	(-77.20)
XREXP	+	0.0938***	0.0938***	0.0939***	0.0882***
		(70.41)	(70.41)	(70.43)	(60.49)

(This table is continued on the next page)

Table 2.5 (Continued)

Variables	Predicted sign	I	II	III	IV
XREXN	-	-0.0954***	-0.0954***	-0.0976***	-0.0953***
		(-64.97)	(-64.97)	(-72.24)	(-64.38)
INTERCEPT	±	0.0237***		0.0604***	
		(3.67)		(4.92)	
Firm-fixed-effects			Yes		Yes
Observations		91,226	91,226	91,226	91,226
R^2		35%	50%	35%	50%

The table reports regression coefficient estimates and (in parentheses) t-statistics. Between 1999 and 2001 is used as a transition period. Firm-fixed-effects are included in the regression reported in columns II and IV of the table. All variables are defined as before (see also Appendix 2). ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

Thirdly, to ascertain the sensitivity of the results to the product market competition measure, I used an alternative measure of product market competition. In equation 2.4, I employed the original product market competition variables. In this section, however, I create one overall variable using principal component analysis. Principal component analysis reveals one factor with an eigenvalue greater than one that explains approximately 50 percent of the total variance. The factor has also large loadings on the MKTSIZE, DIFF, and ENTCOST variables. As a result, I use the first principal component (denoted COMP) as a measure of product market competition to test my second hypothesis using the following regression equation:

$$IU = \Upsilon_0 + \Upsilon_1 POST + \Upsilon_2 COMP + \Upsilon_3 POST * COMP + \Upsilon_4 SIZE + \Upsilon_5 BTM + \Upsilon_6 ROA + \Upsilon_7 LEV + \Upsilon_8 SYNCH + \Upsilon_9 TIMEY + \Upsilon_{10} ASP + \Upsilon_{11} ASN + \Upsilon_{12} XREXP + \Upsilon_{13} XREXN + \Omega \quad (2.6)$$

where COMP is the product market competition proxy, which is the first principal component obtained from the principal component analysis. A higher value of COMP indicates a lower level of product market competition. All other variables are defined as before (see also Appendix 2).

Table 2.6 reports the regression results for equation (2.6). The coefficient on POST*COMP is positive and significant ($\Upsilon_3 = 0.0007$; t = 5.02), which implies that the higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates. After including firm dummies in the regression (firm-fixed-effects regression), the results presented in Column II of Table 2.6, the estimated coefficient on POST*COMP, is also positive and significant ($\Upsilon_3 = 0.0003$; t = 1.68). This finding is consistent with my main findings.

Fouthly, as an alternative test, I re-estimated equations (2.3) and (2.4) by replacing all variables with their annual changes. Differencing the observations left me with a sample of 67,713 firm-year observations. The result (untabulated) of the regression

analysis shows that the coefficient on POST is negative and significant (γ_1 = - 0.2425; t = -4.72). After including firm dummies in the regression (firm-fixed-effects regression), the estimated coefficient on POST is also negative and significant (γ_1 = - 0.1302; t = -2.48), which indicates that investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is lower after the adoption of SFAS 133. This confirms the previous findings. I also find that the estimated coefficient on POST*MKTSIZE is positive and significant (Θ_3 = 0.4327; t = 6.79), POST*DIFF is negative and significant (Θ_5 = -2.1930; t = -6.02) and POST*ENTCOST is negative and significant (Θ_7 = -0.1909; t = -4.16). After including firm dummies in the regression (firm-fixed-effects regression), the estimated coefficient on POST*MKTSIZE is still positive and significant (Θ_3 = 0.4066; t = 6.18), POST*DIFF is still negative and significant (Θ_5 = -1.9266; t = -5.30) and POST*ENTCOST is also negative and significant (Θ_7 = -0.0249; t = -5.04), which continue to indicate that the larger the market size, the greater product substitutability, and the lower entry costs to an industry, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in exchange rates.

Table 2.7: *SFAS 133, Product Market Competition, and Investors' Uncertainty*

Variables	Predicted sign	I	II
POST	-	-0.0056***	-0.0459***
		(-12.24)	(-6.87)
COMP	±	-0.0009***	-0.0004*
		(-7.24)	(-1.66)
POST*COMP	+	0.0007***	0.0003*
		(5.02)	(1.68)
SIZE	-	0.0001	-0.0059***
		(1.62)	(-3.01)
BTM	-	-0.0004***	-0.0025
		(-2.94)	(-0.93)
ROA	-	-0.0022***	(-0.0082)
		(-4.29)	(-1.28)
LEV	-	-0.0001	-0.0007
		(-0.20)	(-0.07)
SYNCH	-	-0.0002**	-0.0007
		(-3.30)	(-0.99)
TIMEY	±	0.0004***	0.0025***
		(12.97)	(4.52)
ASP	+	0.0141***	1.0825***
		(11.40)	(58.99)
ASN	-	-0.0250***	-1.4657***
		(-16.18)	(-77.80)
XREXP	+	0.0065***	0.0889
		(52.29)	(61.58)
XREXN	-	-0.0091***	-0.0959***
		(-63.82)	(-65.46)
Intercept	±	0.0003***	
		(0.003)	
Firm-fixed-effects			Yes
Observations		92,392	92,392
R^2		13%	50%

The table reports regression coefficient estimates and (in parentheses) t-statistics. COMP product market competition proxy, which is the first principal component retained from the principal component analysis. All variables are defined as before (see also Appendix 2). Firm-fixed-effects are included in the regression reported in column II of the table. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

Finally, prior studies (e.g., Petersen 2009) suggest that in regression analyses with panel data, the residuals may be correlated across firms and across time, and OLS standard errors can be biased. To adjust the standard errors for residual correlation (both within firms over time, and across firms each time period), Petersen (2009) suggests to estimate the standard errors with clustering along multiple dimensions

(firm and year). As my sample comprises panel data, I test whether my results are sensitive for residual correlation. Using the approach discussed by Petersen 2009, I estimate the standard errors with clustering along multiple dimensions (firm and year). Untabulated results show that the findings of this study are robust.

2.7 Summary and conclusion

Statement of Financial Accounting Standards No. 133, *Accounting for Derivatives Instruments and Hedging Activities*, is a comprehensive accounting standard for all derivative instruments. SFAS 133 requires firms to report all derivative instruments on the balance sheet at fair value, and the gains or losses resulting from the changes in fair value must be recorded in earnings and/or as a component of other comprehensive income. SFAS 133 is arguably one of the most controversial accounting standards ever issued by the Financial Accounting Standards Board (FASB). In this study, I examined whether SFAS 133 helps investors to better predict the future cash flow implications of changes in foreign currency exchange rates. Moreover, I investigated whether the level of product market competition affects the impact of SFAS 133 on investors' uncertainty about the future cash flow implications of changes in foreign currency exchange rates.

Following Kim and Verrecchia (1994), I developed two hypotheses: (1) investors' uncertainty about the cash flow implications of changes in foreign exchange rates is lower in the post-SFAS 133 period than in the pre-SFAS 133 period, and (2) the higher the level of product market competition, the weaker the effect of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. To capture different dimensions of product market competition, I used market size, product substitutability, entry costs, and concentration ratio. Consistent with my predictions, I find a significant decrease in investors' uncertainty about changes in exchange rates in the post-SFAS 133 period, which indicates that SFAS 133 indeed increases transparency about the risks associated with derivative instruments and hedging activities, and thus it helps investors to better predict firm-specific cash flow implications of changes in foreign currency exchange rates. Second, I find that the higher the level of product market competition, the weaker the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. This supports anecdotal evidence that there are proprietary costs associated with the recognition and disclosure of derivative instruments and hedging activities under SFAS 133, and that these costs increase with the level of product market competition. As a result, firms operating in high competitive industries will strategically recognize and/or disclose their derivative instruments and hedging activities to protect their proprietary information.

My findings contribute not only to the accounting literature, but also to the general debate about whether the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 provides useful information to investors. Overall, my findings indicate that derivative instruments and hedging activities recognition and disclosure under SFAS 133 provides additional useful information to investors to better predict the cash flow implications of changes in foreign currency exchange rates. However, the proprietary costs associated with derivative instruments and hedging activities affect firms' accounting recognition and disclosure decisions, which

reduces the effectiveness of SFAS 133 in providing useful information to investors.

Appendix 2 Variable Definitions

Variable name and description

IU is investors' uncertainty about the cash flow implications of changes in exchange rates which is measured as the estimated coefficient (i.e.,α_1) in model 2.1.

POST is an indicator variable that takes the value of one for fiscal years ending after the adoption of SFAS 133 and equals zero otherwise.

MKTSIZE is the natural logarithm of industry sales (at the four-digit SIC code level).

DIFF is the natural logarithm of industry sales divided by industry operating costs (at the four-digit SIC code level).

ENTCOST is the natural logarithm of the weighted average gross value of the cost of property, plant and equipment for firms for which this is the primary industry (at the four-digit SIC code level), weighted by each firm's market share in this industry.

CONC is the industry sales concentration ratio of the four largest firms in the particular industry.

SIZE is the natural logarithm of the market value of shareholders' equity.

BTM is the ratio of net income to total assets.

ROA is the ratio of total liabilities to total assets.

LEV is the ratio of total liabilities to total assets.

SYNCH is the natural logarithm of $[R^2/(1\text{-}R^2)]$ where R^2 is the coefficient of determination estimated by regressing company's returns on the market returns.

TIMEY is the rank of the financial reporting dates.

ASP is the value of the intercept (i.e.,α_0) estimated in model 2.1 if the association between spreads and changes in foreign exchange rate is positive and equals zero otherwise.

ASN is the value of the intercept (i.e.,α_0) estimated in model 2.1 if the association between spreads and changes in foreign exchange rate is negative and equals zero otherwise.

XREXP is the value of foreign exchange rate risk exposure (i.e.,β_1) estimated in model 2.2 if the association between spreads and changes in foreign exchange rate is positive and equals zero otherwise.

XREXN is the value of foreign exchange rate risk exposure (i.e.,β_1) estimated in model 2.2 if the association between spreads and changes in foreign exchange rate is negative and equals zero otherwise.

3

Investors' responses to macro-economic news: The role of accounting recognition and disclosure

3.1 Introduction

In this chapter, I examine whether the quality of accounting recognition and disclosures affects investor responses to macro-economic news. I also examine the variation in the effect of the quality of accounting recognition and disclosures on investors' responses to macro-economic news across firms. Specifically, I address the question whether investors respond more asymmetrically to good and bad interest rate news when the information that they receive is more ambiguous with respect to the implications of changes in interest rates for a firm's value.[1] Moreover, I address the question whether the asymmetric responses to good and bad interest news varies between firms with higher earnings volatility and firms with lower earnings volatility. Several studies have shown that investors respond asymmetrically to good and bad news (e.g., Rogers and Stocken 2005; Kothari et al., 2009). Some of the explanations offered for such asymmetric responses are differences in the credibility of good and bad news

[1] In this study, the term ambiguity implies that signals have a range of possible levels of precision (quality), i.e., from precise (informative) to imprecise (uninformative).

(Rogers and Stocken 2005) and managers' withholding bad news and accelerating the disclosure of good news (Kothari et al., 2009). Recent theoretical literature suggests that if ambiguity-averse investors do not know the true precision of the information they receive, they respond asymmetrically, i.e., weakly to good news, and strongly to bad news (Epstein and Schneider 2008). Furthermore, they show that information quality is more relevant for firms with higher underlying fundamental volatility than for firms with lower underlying fundamental volatility. Consequently, when information quality is low, investors respond more asymmetrically to good and bad interest rate news for firms with higher underlying fundamental volatility than for firms with lower underlying fundamental volatility. Empirical evidence on these issues, however, is limited.

Financial theory suggests that the issue of changes in interest rate is important to individual investors and firms. This is because changes in interest rate influence firm value by changing the discount rate and by affecting expectations about future cash flows (Lobo 2002). Prior studies that examine investor responses to interest rate news assume, at least implicitly, that responses to good and bad interest rate news are symmetric. Studies by Chance and Lane (1980) and Gultekin and Rogalski (1979) show that stock returns exhibit little sensitivity to changes in interest rates. On the other hand, studies by Booth and Officer (1985), Scott and Peterson (1986), Bae (1990), Elyasiani and Mansur (2004), and Zhu et al. (2007) show that changes in interest rates tend to be significantly negatively related to changes in stock prices. This suggests that an increase in interest rates will lead the stock price to decline whereas a decrease in interest rates will lead the stock price to rise. Although previous studies document the relevance of accounting recognition and disclosures (e.g., Verrecchia 2001), the question whether the quality of accounting recognition and disclosure affects investor responses to good and bad interest rate news has not yet been examined. This study aims to fill these gaps in the literature outlined above.

Analytical work by Epstein and Schneider (2003; 2008) shows that while investors do not know the true (unique) precision of information signals, they do know that the true precision is contained with in a range of possible precisions. This range of possible precisions represents the ambiguity faced by investors. Epstein and Schneider also show that an ambiguity-averse agent behaves as if maximizing expected utility under a worse-case belief. When an ambiguity-averse agent observes a bad (good) signal, the worse-case scenario is that the signal is precise (imprecise). Consequently, if the range of the set of possible precisions expected by ambiguity-averse investors is large (i.e., there is high uncertainty about the precision of the signal), they will react more asymmetrically to good and bad news, whereas if the range of the set of possible precisions expected by ambiguity-averse investors is small they will react less asymmetrically to good and bad news. Following Epstein and Schneider (2008), I expect that when the quality of accounting recognition and disclosures is higher, the range of the set of possible precisions goes down. As a result, I posit that responses to

good and bad interest rate news are less asymmetrical when the quality of accounting recognition and disclosures is higher. I also posit that responses to good and bad interest rate news before the adoption of SFAS 133 are more asymmetrical for firms with higher earnings volatility than for firms with lower earnings volatility. Because the quality of derivative instruments and hedging activities recognition and disclosure matters more for firms with higher earnings volatility than for firms with lower earnings volatility, I posit that the asymmetric responses to good and bad interest rate news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility.

To test my hypotheses, I define good (bad) news as information that increases (decreases) firm value. Consequently, in my empirical tests, I classify changes in interest rates as good (bad) news when the changes in firm value due to changes in the daily interest rate are positive (negative). Like prior studies (e.g., Zhang 2009), I measure earnings volatility by the standard deviation of quarterly net income deflated by total assets. Because derivative instruments and hedging activities recognition and disclosure under SFAS 133 has improved transparency about the risks associated with derivatives and hedging activities and helps investors to better predict future cash flows, I assume that the quality of derivatives recognition and disclosure is higher after the implementation of SFAS 133. I measure the magnitude of the asymmetric responses to good and bad interest rate news based on the differences between the coefficients on good and bad interest rate news.

Analyzing a sample of 771,445 firm-day observations in the period from 1990 to 2009, I find that investors respond asymmetrically to good and bad interest rate news. Specifically, investors react more strongly to bad interest rate news than to good interest rate news. Moreover, I find that, following the adoption of SFAS 133, the asymmetric responses to good and bad interest rate news is less pronounced. More specifically, investors discount good interest rate news less heavily in the post-SFAS 133 period than in the pre-SFAS 133 period. This finding indicates that investors discount good interest rate news less heavily following a decrease in the range of possible levels of precision due to higher quality of accounting recognition and disclosure. I also find that the asymmetric responses to good and bad interest rate news in the pre-SFAS 133 period is more pronounced for firms with higher earnings volatility than for firms with lower earnings volatility. Importantly, I find that after the adoption of SFAS 133, the asymmetric responses to good and bad interest rates news decreases more for firms with higher earnings volatility than for firms with lower earnings volatility. Interestingly, I find that SFAS 133 has no effect on the asymmetric responses to good and bad interest rate new for firms with low earnings volatility. This suggests that the quality of accounting recognition and disclosures is more important for firms with higher earnings volatility than for firms with lower earnings volatility. The empirical results are robust across several tests.

This paper makes several contributions to the literature. First, to my knowledge,

this is the first study that examines the effect of the quality of accounting recognition and disclosures on investor responses to good and bad interest rate news. Specifically, this paper contributes to the literature by providing empirical evidence that investors respond more asymmetrically to good and bad interest rate news at times when the quality of accounting recognition and disclosures is lower. Second, this study contributes to the literature by documenting that investors respond more asymmetrically to good and bad interest rate news for firms with higher earnings volatility than for firms with lower earnings volatility. Third, this paper provides empirical evidence on the cross-sectional variation in the importance of information quality. Specifically, the asymmetric responses to good and bad interest rates news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility. Fourth, this study contributes to the general debate on the relevance of SFAS 133 by documenting that investor responses to good and bad interest rate news is less asymmetric after SFAS 133 adoption than before. This confirms my assumption that derivative instruments recognition and disclosure under SFAS 133 has increased the quality of accounting recognition and disclosure and benefited investors by reducing information ambiguity. Fifth, this study is also of interest to accounting standard setters when they evaluate whether SFAS 133 has been effective in reducing ambiguity in the market. Finally, this study contributes to the general debate about whether recognition is an appropriate substitute for disclosure. Consistent with Ahmed et al. (2006), my findings show that recognition and disclosure are not substitutes.

The remainder of this paper is organized as follows. The next section reviews prior related studies. Section 3.3 develops the hypotheses. Section 3.4 details the research design. The sample selection procedures and descriptive statistics are provided in section 3.5. Section 3.6 describes the empirical findings. Section 3.7 provides a brief summary and conclusion.

3.2 Literature review

In this section, I briefly summarize the literature on stock price reaction to good and bad news and stock price reaction to changes in interest rates. Studies in the first category have documented that stock price reaction to voluntary bad news disclosures is larger than stock price reaction to voluntary good news disclosures (Skinner 1994; Basu 1997; Rogers and Stocken 2005; Kothari et al. 2009).

Skinner (1994) interprets the asymmetric stock price responses to bad and good news as evidence that managers disclose bad news more quickly than good news, and argues that litigation risk is a major motivating factor. That is a rapid announcement of bad news can mitigate litigation costs by reducing the number of potential plaintiffs who could claim they bought shares while managers were withholding bad news. Consistent with this argument, Skinner (1994) also finds that managers are likely to

voluntarily disclose bad news more quickly than good news. Furthermore, he finds that stock price responses to bad news disclosures are larger than stock price responses to good news disclosures.

In another empirical study, Rogers and Stocken (2005) argue that investors often interpret bad news as being more credible than good news.[2] Consequently, stock price responses to bad news are larger than stock price responses to good news. Using positive and negative management forecast errors as a proxy for bad news and good news, respectively, they find that investors are more responsive to bad news than to good news.

From an accounting rule perspective, Basu (1997) investigates the conservatism principle of reported financial statements by regressing annual earnings on annual stock returns.[3] Basu predicts that conservatism results in a more timely recognition in earnings of bad news than good news, and therefore the sensitivity of earnings to negative returns is greater than the sensitivity of earnings to positive returns. Consistent with this prediction, he finds that the sensitivity of earnings to negative returns is two to six times that of earnings to positive returns.

In contrast to the above studies, Kothari et al. (2009) argue that managers withhold bad news and disclose good news quickly due to career concerns.[4] Based on the assumption that managers act strategically by gathering and withholding bad news while leaking good news quickly to the market, they find that the negative stock price reaction to bad news is larger than the positive stock price reaction to good news. They interpret this as evidence that management, on average, delays the release of bad news to investors.

Studies in the second category examine stock price sensitivity to changes in interest rates. Studies in this category include Gultekin and Rogalski (1979), Chance and Lane (1980), Booth and Officer (1985), Bae (1990), and Elyasiani and Mansur (2004).

The findings of these studies have generally been inconsistent. Early studies by Chance and Lane (1980) and Gultekin and Rogalski (1979) show that changes in interest rates have little impact on returns. Chance and Lane (1980) test the effect of changes in interest rates on the returns of commercial banks, using data from 1972 to 1976 to test interest rate sensitivity in a multi-index market model. They find that less than two percent of the examined banks exhibit significant interest rate sensitivity. The findings suggest that commercial bank stocks are less affected by changes in interest rates.

The above findings, however, were challenged by Booth and Officer (1985), Bae (1990), and Elyasiani and Mansur (2004), all of whom document significant negative

[2]Because management has an incentive to embellish news, investors view voluntary good news disclosure with more skepticism than voluntary bad news disclosure.

[3]Negative annual returns, which are proxy for bad news; and positive annual returns, which are proxy for good news.

[4]Examples include compensation, promotion, employment opportunities within and outside the firm, potential termination, bonus payments, and a reduction in the quantity of stock options.

interest rate sensitivity. Booth and Officer (1985) examine the interest rate sensitivity of commercial banks relative to nonfinancial firms using a pooled cross-sectional time-series model. Using data from 1966 to 1980, they find that bank stocks show extra-market sensitivity to changes in short-term interest rates. Similarly, Bae (1990) re-examined the interest rate sensitivity of common stock returns of financial firms by incorporating nondepository firms. He applies current, anticipated, and unanticipated changes in interest rates for a period from 1974 to 1985 and finds that both current and unanticipated changes in interest rates significantly affect stocks of financial firms.

A more recent study by Elyasiani and Mansur (2004) extends prior studies by analyzing bank stock sensitivity to changes in long-term and short-term interest rates as alternative proxies for market interest rate variables within a multivariate generalized autoregressive conditionally heteroskedastic (MGARCH) framework. They used data from 1988 to 2000 and find evidence of significant negative interest rate sensitivity.

Although these prior studies provide insights into the asymmetry of investor responses to good and bad news, the role of the quality of accounting recognition and disclosures on investor responses to good and bad interest rate news has not yet been examined. In this study, I therefore examine the effect of the quality of accounting recognition and disclosures on investor responses to good and bad interest rate news. Moreover, I examine the variation in the effect of the quality of accounting recognition and disclosures on investor responses to good and bad interest rate news across firms.

3.3 Theory and hypotheses

3.3.1 SFAS 133 and investors' responses to good and bad interest rate news

The traditional market model assumes that the majority of investors are rational and wealth-maximizing individuals. Thus, new information is priced by market participants immediately in an unbiased fashion (Fama, 1991). However, there is evidence from financial and psychological literature that suggests that individuals' decisions actually depart from standard Bayesian rationality (e.g., Hirshleifer 2001).

Analytical work by Epstein and Schneider (2008) shows that under greater information ambiguity, investors weight bad news more heavily than good news. In their model, market participants know that the true precision of future information signals is contained in a set of possible precisions, but they cannot assess priors over this set. To be concrete, let θ be a parameter that an investor wants to learn, while investors observe the noisy signal s which can be expressed as follows:

$$s = \theta + \epsilon, \epsilon \sim N(0, \sigma_s^2), \sigma_s^2 \in [\underline{\sigma_s^2}, \overline{\sigma_s^2}] \tag{3.1}$$

where ϵ is the noise in the signal s, and the precision of information is measured by the inverse of the standard deviation of the noise (i.e., $1/\sigma_s^2$). In the model,

information quality is captured by the range of possible information signal precisions $[1/\overline{\sigma_s^2}, 1/\underline{\sigma_s^2}]$. Because the true precision of the signal is unknown, the agent forms a set of possible precisions that reflects that the signal is precise $(1/\underline{\sigma_s^2})$ or imprecise $(1/\overline{\sigma_s^2})$. The degree of ambiguity of the signal can be measured by $1/\overline{\sigma_s^2}$ - $1/\underline{\sigma_s^2}$, and the wider the interval, the more ambiguous the signal.

Epstein and Schneider (2003) show that an ambiguity-averse agent behaves as if he maximizes expected utility under the worst-case belief that is chosen from the set of possible conditional probabilities. Thus, following their model, when an ambiguous signal conveys bad (good) news, the worst case scenario is that the signal is reliable (unreliable). As a result, if the range of the set of possible precisions expected by ambiguity-averse investors is large (i.e., high uncertainty about the precision of the signal) then they will react more asymmetrically to good and bad news, and if the range of the set of possible precisions expected by ambiguity-averse investors is small then they will react less asymmetrically to good and bad news.

Prior anecdotal and empirical evidence suggests that higher quality accounting information recognition and disclosure reduces ambiguity by reducing uncertainty about future cash flows and earnings predictions. As Neel Foster (2003), a former member of the Financial Accounting Standards Board, puts it, high quality information always equates to less uncertainty. Consistent with this view, Lambert et al. (2007) show that high quality accounting information reduces ambiguity by reducing the assessed variance of a firm's future cash flows. Similarly, Yae (2012) indicates that when there is high ambiguity about the cash flow implications of a signal, but investors receive high quality information, the potential influence of the information on ambiguity is high as well.

In short, higher quality accounting information recognition and disclosure practices decrease the ambiguity about the precision of information that investors receive, and thus investors react less asymmetrically to good and bad news.

Ambiguity with respect to the precision of interest rate news can potentially result when the quality of accounting information recognition and disclosure creates a lack of confidence by investors resulting in a reduction of confidence in interpreting the precise firm-specific cash flow implications of changes in interest rates for firm value.[5]

In chapter two, I showed that derivative instruments and hedging activities recognition and disclosure under SFAS 133 improves transparency and comparability about the risks associated with derivative instruments and hedging activities by requiring that all derivative instruments be reported on the balance sheet at fair value, by reducing off-balance-sheet transactions, and by requiring firms to give a more detailed picture of their risk situation. As a result, SFAS 133 reduces investors' uncertainty about the cash flow implications of changes in market rates, which should indeed

[5]Changes in interest rates per se are not a firm-specific signal. However, prior studies suggest that it has firm-specific implications because it is associated with equity returns and earnings (e.g., Linsmeier et al. 2002). I assume that the cash flow implications of changes in interest rates for firm value varies over time.

result in a reduction in ambiguity about the precision of the cash flow implications of changes in market rates.

Following the above discussion, I expect that the firm-specific cash flow implications of changes in interest rates are less ambiguous after the implementation of derivative instruments and hedging activities recognition and disclosure under SFAS 133. More specifically, the range of the set of possible precisions expected by ambiguity-averse investors is narrower after the adoption of SFAS 133 because the transparency due to SFAS 133 decreases the imprecision of information (i.e., $\overline{\sigma_s^2}$ decreases). Thus, before the adoption of SFAS 133, when investors receive good and bad interest rate news they react more asymmetrically to good and bad interest rate news than after the adoption of SFAS 133.

Given the above arguments, I specifically predict that investors react more asymmetrically to good and bad interest rate news before the implementation of SFAS 133 than after the implementation of SFAS 133. Thus, I formulate the following hypothesis:

H1: Investors respond more asymmetrically to good and bad interest rate news before SFAS 133 adoption than after SFAS 133 adoption.

3.3.2 SFAS 133, investors' responses to good and bad interest rate news, and earnings volatility

Prior studies show that more earnings volatility is likely to be noisier and perceived as lower quality, and thus it creates a demand for additional information to help investors better predict future cash flow and earnings (e.g., DeFond and Hung 2003; Dichev and Tang 2009). Consistent with this view, Zhang (2006) argues that not only information quality, but also underlying fundamental volatility plays a role in uncertainty about future cash flow predictions. Similarly, Epstein and Schneider (2008) indicate that the importance of information quality varies across firms according to their level of underlying fundamental volatility. Specifically, market participants do not demand high information quality if the underlying fundamental volatility is lower. Consequently, the asymmetric responses to good and bad news should be small, even if information is highly ambiguous. In contrast, when the underlying fundamental volatility is higher, investors demand high information quality and, therefore, the asymmetric responses to good and bad interest rate news is larger when information is highly ambiguous. Thus, I expect that cross-sectional differences in underlying earnings volatility affect the impact of the quality of accounting recognition and disclosure on investors' responses to good and bad interest rate news.

Following the above discussion, I predict that the asymmetry in responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher underlying earnings volatility than for firms with lower underlying earnings volatility. Moreover, I expect that the reduction in ambiguity due to SFAS 133 mat-

ters more for firms with higher underlying earnings volatility than for firms with lower underlying earnings volatility. Thus, I predict that the decrease in asymmetric responses to good and bad interest rate news after the adoption of SFAS 133 is higher for firms with higher earnings volatility than for firms with lower earnings volatility. Consequently, I formulate the following two hypotheses:

H2: The asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher earnings volatility than for firms with lower earnings volatility.

H3: The asymmetric responses to good and bad interest rate news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility.

3.4 Research design

3.4.1 Variable measurement

Measuring good and bad interest rates news

Changes in interest rates can affect a firm's value in several ways. One way changes in interest rates could affect firm value is through the valuation of stocks. Stocks are commonly valued at the present value of their future cash flows. A rise in interest rates reduces the present value of future cash flows which should depress stock prices. Conversely, lower interest rates result in a lower opportunity cost of borrowing. This stimulates investment and economic activities, which would cause stock prices to rise. While this argument suggests that there is a negative relationship between interest rates and stock prices, understanding the causes of changes in interest rates is important. If the goal of rising interest rates is to limit inflation pressure, then it should have a positive impact on the stock market, and vice versa. Moreover, conventional assumptions suggest that a rise in the interest rate attracts foreign capital, leading to a rise in exchange rates, and vice versa. Consequently, exporting (importing) firms may benefit (lose) from a depreciation of the local currency. Even firms that are not engaged in international business activity directly could also be affected by exchange rates through competition with foreign firms (Dominguez and Tesar 2006). Thus, an increase or a decrease in interest rates can be good news for some firms and bad news for others.

In this study, I classify interest rate change signals as good (bad) interest rate news when firm value changes due to daily interest rate changes are positive (negative). To construct good and bad interest rate news, I proceed in two steps. First, I estimate firm-year specific interest rate risk exposure for the whole sample period using weekly data. Following the approach in prior studies (Guay 1999; Wong 2000; Zhang 2009),

I use the following three-factor model to estimate interest rate exposure for every firm-year[6]:

$$LOGRET = \alpha_0 + \alpha_1 IR + \alpha_2 XR + \alpha_3 LOGIRET + \mu \quad (3.2)$$

where LOGRET is the natural logarithm of weekly returns, IR is the weekly percentage change in the value of the short-term (three-month Treasury bill) interest rates, XR is the weekly percentage change in the Federal Reserve Board trade-weighted US dollar index, and LOGIRET is the natural logarithm of the weakly market return. I measure the firm-year specific interest rate risk exposure (i.e., the sensitivity of returns to interest rate movements) using the estimated coefficient on IR (i.e.,α_1) from the above regression equation.

In the next step, I merge the firm-year specific interest rate risk exposure coefficients estimated in equation (3.2) with the daily returns data. Using the new (merged) dataset, I define interest rate news as good news (GNEWS) if the interest rate exposure estimated is significantly positive at the 5% level and the daily percentage change in the value of interest rates is positive, or if the interest rate exposure estimated is significantly negative at the 5% level and the daily percentage change in the value of interest rates is negative. I define interest rate news as bad news (BNEWS) if the interest rate exposure estimated is significantly positive at the 5% level and the daily percentage change in the value of interest rates is negative, or if the interest rate exposure estimated is significantly negative at the 5% level and the daily percentage change in the value of interest rates is positive. To account for the magnitude of changes in interest rates, I interacted GNEWS and BNEWS variables with the daily percentage change in the value of the short-term (three-month Treasury bill) interest rates in my regression analyses.

SFAS 133 as a proxy for the quality of accounting recognition and disclosure

Prior to SFAS 133, the accounting treatment for derivative instruments was incomplete and inconsistent (SFAS 133, paragraphs 235 and 236). SFAS 133 (paragraph 235) notes that "before the issuance of this statement, accounting standards specifically addressed only a few types of derivatives" and that many derivative instruments were carried "off-balance-sheet" regardless of whether they were formally part of a hedging strategy. Moreover, prior to the issuance of SFAS 133 "the accounting standards were inconsistent on whether qualification for hedge accounting was based on

[6]To estimate this equation, I use the Generalized Method of Moments (GMM) with the heteroskedasticity and autocorrelation consistent (HAC) standard errors (Newey-West standard errors) option to correct for heteroscedasticity and autocorrelation (Wooldridge 2002). The PROC MODEL procedure with the GMM estimation in the FIT statement and KERNEL option in the SAS statistical software package provides this flexibility.

risk assessment at an entity-wide or an individual level" (SFAS 133, paragraph 236). In contrast to the prior accounting standards, prior studies indicate that SFAS 133 reduces the inconsistency, incompleteness, and difficulty of applying previous guidance and practice by providing comprehensive guidance for all derivatives and hedging activities. For example, Ahmed et al. (2011) and chapter two of this dissertation have shown that the transparency and monitoring of the risk implications of derivative instruments and hedging activities have increased following the adoption of SFAS 133. Thus, I assume that the firm-specific cash flow implications of changes in interest rates for firm value are clearer (less ambiguous) after the adoption of SFAS 133.

Control variables

Following prior research (e.g., Fama and French 1992; Daske et al. 2008; Bhabra et al. 2011), I include several control variables that are expected to influence stock prices. I control for firm size (SIZE) because larger firms have greater access to both internal and external capital than smaller firms and thus the stock price reaction is larger for larger firms than for smaller firms. I measure SIZE as the natural logarithm of the market value of equity. I control for book to market ratio (BTM) because firms with more growth opportunity should have lower dividend yields than firms with low growth opportunity and thus their stock price reaction differs. I measure BTM as the ratio of a firm's book value to market value of equity. I control for leverage (LEV) because a firm with higher leverage may not invest in profitable projects. Such a firm can also indicate corporate manager efficiency by servicing higher levels of debt. Thus, the association between leverage ratio and stock price is not clear. I measure LEV as the ratio of total liabilities to total assets. I also control for market volatility because stock prices and the Chicago Board Options Exchange (CBOE) volatility index (VIX) are negatively correlated. VIX is the Chicago Board Options Exchange (CBOE) volatility index measured at the end of the fiscal year.

3.4.2 Hypotheses test

SFAS 133 and investors' responses to good and bad interest rate news

To test whether investors respond more asymmetrically to bad and good interest rate news before than after the adoption of SFAS 133 (i.e., to test hypothesis 1), I use the following regression equation:

$$\begin{aligned} RET = {} & \gamma_0 + \gamma_1 GNEWS + \gamma_2 BNEWS + \gamma_3 POST + \gamma_4 GNEWS * POST + \\ & \gamma_5 BNEWS * POST + \gamma_6 SIZE + \gamma_7 BTM + \gamma_8 LEV + \gamma_9 VIX + \omega \end{aligned} \quad (3.3)$$

where RET is market-adjusted returns, which is calculated as the natural logarithm of the daily firm-level returns minus the natural logarithm of the daily market returns. All other variables are defined as before.

Following my prediction in hypothesis 1, I expect that ($|\gamma_2|$ - γ_1) to be higher than ($|\gamma_2 + \gamma_5|$ - [$\gamma_1 + \gamma_4$]).

SFAS 133, investors' responses to good and bad interest rate news, and earnings volatility

To test my second and third hypotheses, I use the following regression equation:

$$\begin{aligned} RET = \Theta_0 + \Theta_1 GNEWS + \Theta_2 BNEWS + \Theta_3 POST + \Theta_4 VOLT + \Theta_5 GNEWS * POST \\ + \Theta_6 BNEWS * POST + \Theta_7 GNEWS * VOLT + \Theta_8 BNEWS * VOLT \\ + \Theta_9 VOLT * POST + \Theta_{10} GNEWS * VOLT * POST + \Theta_{11} BNEWS * VOLT * POST \\ + \Theta_{12} SIZE + \Theta_{13} BTM + \Theta_{14} LEV + \Theta_{15} VIX + \lambda \quad (3.4) \end{aligned}$$

where VOLT is an indicator variable which is equal to one if the value of the earnings volatility is greater than or equal to the median value of earnings volatility of all firms and is equal to zero otherwise.[7] All other variables are defined as before.

I employ two different regression models to test equation 3.3 and 3.4. The first is an OLS regression. I also use a second regression model. This second model is fixed-effects model, where I include firm dummies in the regressions. This allows me to control for unobserved firm effects (fixed effects) on investors' response to interest rates news that are assumed to be constant through time but vary across firms (Wooldridge 2002).

3.5 Sample selection and descriptive statistics

3.5.1 Sample selection and data sources

The sample used in this study covers firms in the U.S. with fiscal years ending on or after January 15, 1990 through December 31, 2009. To ensure that the sample period before and after the adoption of SFAS 133 is sufficiently long, I start in 1990 and end in 2009. I exclude the transition period (between 2000 and 2001) from the analyses to avoid any temporary changes caused by SFAS 133 adoption.

I collected market security data from the Center for Research in Security Prices (CRSP) database. Financial accounting data along with the reporting dates were collected from the Compustat North America database. I obtained market interest

[7] Using an indicator variable makes the interpretation easier.

rates and foreign currency exchange rate data from the U.S. Federal Reserve database. VIX data were collected from the CBOE website. All other macroeconomic data were collected from the U.S. Department of Labor and Commerce website.

To mitigate the influence of outliers, all variables are winsorized at the 0.5 and 99.5 percentiles. I deleted observations with insignificant interest rate exposure coefficients at 5% level. I also deleted observations with missing values and observations that are from the transition period. The final sample consists of 771,445 firm-day observations over the period of 1990 to 2009. Table 3.1 reports the sample composition by industry.

Table 3.1: *Composition of Sample by Industry**

Industry-type	No. of firm-years	Percent	Industry-type	No. of firm-years	Percent
Agriculture	2641	0.34	Insur	18724	2.43
Autos	10766	1.40	LabEq	13646	1.77
Banks	9474	1.23	Mach	26474	3.43
Beer	3235	0.42	Meals	15286	1.98
BldMt	11509	1.49	MedEq	28448	3.69
Books	5867	0.76	Mines	6037	0.78
Boxes	1717	0.22	Misc	7147	0.93
BusSv	86769	11.25	Paper	10560	1.37
Chems	15450	2.00	PerSv	6608	0.86
Chips	49543	6.42	RlEst	7010	0.91
Clths	10367	1.34	Rtail	38448	4.98
Cnstr	9408	1.22	Rubber	5124	0.66
Coal	1888	0.24	Ships	2263	0.29
Comps	34994	4.54	Smoke	949	0.12
Drugs	41053	5.32	Soda	1134	0.15
ElcEq	8120	1.05	Steel	11498	1.49
Enrgy	46520	6.03	Telcm	24192	3.14
FabPr	2643	0.34	Toys	8450	1.10
Fin	30413	3.94	Trans	22724	2.95
Food	12042	1.56	Txtls	3420	0.44
Fun	12807	1.66	Util	29907	3.88
Gold	12257	1.59	Whlsl	33161	4.30
Guns	937	0.12	Hlth	16210	2.10
Hshld	11149	1.45	Total	771,446	100.00
Aero	2457	0.32			

*I use the Fama and French 48 industry classification.

3.5.2 Descriptive statistics

Table 3.2 presents descriptive statistics of the variables used in my regression analyses for the whole sample. Out of the total 771,446 observations, 54.6% of my sample (421,567 firm-day observations) is from the post-SFAS 133 period, while the remaining 45.4% (349,881 firm-day observations) is from the pre-SFAS 133 period. The mean

(median) value of the dependent variable (i.e., market adjusted returns) is -0.001 (-0.001). The difference between the mean and median values of the independent variables is very small, indicating that the variables are not highly skewed.

Table 3.2: *Descriptive Statistics for Variables Used in Regression Analyses*

Variables	N	Minimum	Mean	Median	Std	Maximum
RET	771,446	-1.690	-0.001	-0.001	0.049	1.836
GNEWS	771,446	0.000	0.003	0.000	0.007	0.530
BNEWS	771,446	0.000	0.003	0.000	0.007	0.567
POST	771,446	0.000	0.454	0.000	0.498	1.000
VOLT	771,446	0.000	0.140	0.000	0.347	1.000
SIZE	771,446	0.920	5.607	5.476	2.265	11.434
BTM	771,446	-0.941	0.593	0.460	0.571	43.883
LEV	771,446	0.000	0.220	0.181	0.211	1.080
VIX	771,446	11.250	18.849	19.310	5.884	28.620

The table reports descriptive statistics for the variables used in the regression analyses. All variables are defined as before.

Table 3.3 reports correlations of the key variables used in the regression analyses. Pearson correlations are presented above the diagonal and Spearman rank correlations are presented below the diagonal. The statistics are calculated from the whole sample. There is a positive (negative) relation between GNEWS (BNEWS) and RET, which implies that stock prices on average react positively (negatively) to good (bad) interest rate news.

Table 3.3: *Correlations between Variables Used in Regression Analyses*

VAR	RET	GNEWS	BNEWS	POST	VOLT	SIZE	BTM	LEV	VIX
RET		0.032	-0.038***	0.014***	-0.015***	0.017***	0.006**	0.004***	-0.008***
GNEWS	0.039***		-0.646***	-0.044***	0.028***	-0.069***	-0.000	-0.013***	0.017***
BNEWS	-0.057***	-0.147***		-0.060***	0.027***	-0.072***	-0.004***	-0.007	0.012***
POST	0.005***	-0.075***	-0.084***		-0.068***	0.349***	-0.059***	-0.023***	-0.134***
VOLT	-0.008***	0.070***	0.070***	-0.069***		-0.219***	-0.172***	0.072***	0.018***
SIZE	-0.005***	-0.148	-0.150***	0.346***	-0.218***		-0.300	0.075***	-0.045
BTM	0.004**	0.031***	0.033***	-0.085***	-0.100***	-0.341***		0.065	0.0652***
LEV	-0.000	-0.008***	-0.002**	-0.019***	0.127***	0.029***	-0.017***		0.005***
VIX	-0.004***	0.024***	0.023**	-0.042***	0.019***	-0.013***	0.078***	0.003***	

The table reports the values of the correlations between each of the independent variables. Spearman (Pearson) correlations are above (below) the diagonal. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% level, respectively.

3.6 Main results

In this section of the study, I first report the results for investors' responses to good and bad interest rate news before and after the adoption of SFAS 133 (i.e., hypothesis 1). Then, I present the results for investors' responses to good and bad interest rate news before the adoption of SFAS 133 for firms with higher earnings volatility and for firms with lower earnings volatility (i.e., hypothesis 2). Finally, I present the results on the variation in investors' responses to good and bad interest rate news before and after the adoption of SFAS 133 across firms with higher earnings volatility and firms with lower earnings volatility (i.e., hypothesis 3).

3.6.1 Investors' responses to good and bad interest rate news before and after SFAS 133

To examine the impact of the quality of accounting recognition and disclosures (i.e., SFAS 133) on the asymmetry responses to good and bad interest rate news (i.e., hypothesis 1), I test the difference in the asymmetry between the pre-SFAS 133 and post-SFAS 133 periods. Panels A and B of Table 3.4 provide the results for the regression based on equation (3.3), examining the impact of SFAS 133 on investors' responses to good and bad interest rate news. The results indicate that SFAS 133 indeed affects investors' responses. The results reported in Panel B of Table 3.4 show that the 0.1520 (0.0894) difference between the estimated coefficients on GNEWS and BNEWS for the pre-SFAS 133 period (post-SFAS 133 period) is significantly different from zero, which indicates that investors respond asymmetrically to good and bad interest rate news in both the pre-SFAS 133 and post-SFAS 133 periods.

The results presented in Panel B of Table 3.4 further show that the decline in the asymmetric responses to good and bad interest rate news from 0.1520 to 0.0894 is significant (F = 24.04). This indicates that asymmetric responses to good and bad interest rate news are more pronounced in the pre-SFAS 133 than in the post-SFAS 133 period. This is consistent with the idea that with the implementation of SFAS 133, the future cash flow implications of changes in interest rates for firm value have become less ambiguous than before the adoption of SFAS 133. The fixed-effects regression results reported in Column II of Table 3.4 generally show consistent results with this findings. Consequently, investors discount good interest rate news less heavily after the adoption of SFAS 133.

Taken together, consistent with my prediction (i.e., H1), the results suggest that investors respond asymmetrically to good and bad interest rate news in both the pre-SFAS 133 period and the post-SFAS 133 period; however, this asymmetry decreases significantly following the adoption of SFAS 133.

3.6.2 SFAS 133, investors' responses to good and bad interest rate news, and earnings volatility

To test whether the asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher earnings volatility and for firm with lower earnings volatility (i.e., hypothesis 2), I compare the asymmetric responses before the adoption of SFAS 133 for these firms. Panels A and B of Table 3.5 report the results for the regression based on equation (3.4). The results presented in Panel B reveal that responses to good and bad interest rate news before the adoption of SFAS 133 have greater asymmetry for firms with higher underlying earnings volatility than firms with lower underlying earnings volatility. More specifically, the asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 for firms with higher underlying earnings volatility and for firms with lower underlying earnings volatility is 0.3075 and 0.0834, respectively. This 0.2241 difference between the asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 for firms with higher or lower underlying earnings volatility is significantly different from zero. This implies that uncertainty about the precision of information for firms with higher earnings volatility is higher than for firms with lower earnings volatility. After including firm dummies in the regression, the results reported in Column II of Table 3.5 generally show consistent results with this findings. Thus, consistent with my second hypothesis (i.e, H2), the results show that asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 are greater for firms with higher earnings volatility than for firms with lower earnings volatility.[8]

To test my third hypothesis, to examine the effect of earnings volatility on the impact of SFAS 133 on asymmetric responses to good and bad interest rate news, I test the difference in asymmetry between the pre-SFAS 133 and post-SFAS 133 period for firms with higher and lower earnings volatility. As the results reported in Panel B of Table 3.5 show, the asymmetry of responses to good and bad interest rate news for firms with higher earnings volatility decreased from 0.3075 in the pre-SFAS 133 period to 0.1091 in the post-SFAS 133 period. This decline of 0.1984 is statistically significant. In contrast, the asymmetry of responses for firms with lower earnings volatility decreased from 0.0834 in the pre-SFAS 133 period to 0.0818 in the post-SFAS 133 period, which is not statistically different from zero (F = 0.04). After including firm dummies in the regression, the results reported in Column II of Table 3.5 generally show consistent results with this findings. The results imply that the level of earnings volatility contributes to the relevance of the quality of accounting information. Thus, consistent with my third prediction (i.e., H3), the results suggest that the adoption of SFAS 133 has a significant impact on asymmetric responses to

[8]The asymmetric responses to good and bad interest rate news after the adoption of SFAS 133 is also greater for firms with higher earnings volatility than for firms with lower earnings volatility, but it is clear that higher earnings volatility firms move to lower earnings volatility firms.

good and bad interest rate news for firms with higher earnings volatility, but little (no) impact for firms with lower earnings volatility.

Table 3.4: *Investors' Responses to Good and Bad Interest Rate News and SFAS 133*

Panel A: Coefficient Estimates

Variables	Predicted sign	I	II
GNEWS	+	0.2093***	0.2383***
		(21.93)	(23.64)
BNEWS	-	-0.3613***	-0.3360***
		(-38.87)	(-34.25)
POST	+	0.0001	0.0001***
		(0.34)	(2.93)
GNEWS*POST	+	0.0439**	0.0502***
		(2.54)	(2.75)
BNEWS*POST	±	0.0187	0.0245
		(1.05)	(1.30)
SIZE	±	0.0001**	-0.0013***
		(2.45)	(-6.84)
BTM	±	0.0005***	-0.0001
		(4.91)	(0.38)
LEV	±	-0.0001	-0.0017*
		(-0.17)	(-1.68)
VIX	±	-0.0000***	-0.0000*
		(-3.56)	(-2.08)
INTERCEPT	±	-0.0005*	
		(-1.96)	
Firm-fixed-effects			Yes
Observations		771,446	771,446
R^2		0.40%	0.75%

Panel A of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. Firm-fixed-effects are included in the regression reported in column II of the table. All variables are defined as before. ***, **, and ** denote two-tailed significance at the 1%, 5% and 10% levels, respectively.

Panel B: Investors' Responses to Good and Bad Interest Rate News Before and After SFAS 133

Variables	Before (POST= 0)	After (POST= 1)	Difference (After-Before)
GNEWS	0.2093	0.2532	0.0439
BNEWS	-0.3613	-0.3426	0.0187
Difference (|BNEWS| – GNEWS)	0.1520***	0.0894***	-0.0626**

Panel B of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Table 3.5: *Investors' Responses to Good and Bad Interest Rate News, SFAS 133, and Earnings Volatility*

Panel A: Coefficient Estimates

Variables	Predicted sign	I	II
GNEWS	+	0.2309***	0.2624***
		(20.52)	(22.04)
BNEWS	-	-0.3143***	-0.2876***
		(-28.54)	(-24.71)
POST	+	0.0002	0.0011***
		(1.04)	(3.22)
VOLT	-	-0.0001	
		(-0.45)	
GNEWS*POST	+	0.0180	0.0225
		(0.90)	(1.07)
BNEWS*POST	±	-0.0164	-0.0103
		(-0.79)	(-0.47)
POST*VOLT	±	-0.0003	-0.0007
		(-0.63)	(-0.69)
GNEWS*VOLT	±	-0.0682***	-0.0838***
		(-3.21)	(-3.74)
BNEWS*VOLT	±	-0.1560***	-0.1671***
		(-7.59)	(-7.71)
GNEWS*POST*VOLT	+	0.0888**	0.0991**
		(2.23)	(2.37)
BNEWS*POST*VOLT	±	0.1081***	0.1092**
		(2.60)	(2.55)
SIZE	±	0.0000	-0.0013
		(1.55)	(-6.82)
BTM	±	0.0004***	-0.0015
		(3.90)	(-0.43)
LEV	±	0.0002	-0.0017*
		(0.57)	(-1.69)
VIX	±	-0.0000***	-0.0000**
		(-3.46)	(-2.09)
INTERCEPT	±	-0.0004	
		(-1.62)	
Firm-fixed-effects			Yes
No. of Observations		771,445	771,445
R^2		0.44%	0.75%

Panel A of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. Firm-fixed-effects are included in the regression reported in column II of the table. All variables are defined as before. ***, **, and ** denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Investors' Responses to Good and Bad Interest Rate News, SFAS 133, and Earnings Volatility

Variables		L_VOLT (VOLT= 0)	H_VOLT (VOLT= 1)	Difference (High–Low)
Before (POST=0)	GNEWS	0.2309	0.1627	-0.0682
	BNEWS	-0.3143	-0.4702	-0.1559
	Difference(|BNEWS| – GNEWS)	0.0834***	0.3075***	0.2241***
After (POST=1)	GNEWS	0.2489	0.2695	0.0206***
	BNEWS	-0.3307	-0.3786	-0.0479
	Difference (|BNEWS| – GNEWS)	0.0818***	0.1091***	0.0273***
	Difference (after) - Difference (before)	-0.0016	-0.1984***	
After - Before	GNEWS	0.0180	0.1068***	
	BNEWS	-0.0164	0.0916***	

Panel B of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

3.6.3 Sensitivity tests

I performed additional tests to examine the robustness of my results. First, I investigated whether taking into account the observations from the transition period affects my results. I find similar results after including observations from the transition period in the analyses (untabulated).

Secondly, I examined whether my results are sensitive for changes in the transition period. Using a fiscal year between 1999 and 2001 as a new transition period, I find consistent results with my main findings. Specifically, the results reported in Column I of Table 3.6 show that the asymmetric responses to good and bad interest rate news decreased from 0.1435 in the pre-SFAS 133 period to 0.0875 in the post-SFAS 133 period. After including firm dummies in the regression, the results reported in Column II of Table 3.6 show that the asymmetric responses to good and bad interest rate news still decreases from 0.0866 in the pre-SFAS 133 period to 0.0233 in the post-SFAS 133 period. These results are similar to those reported in Table 3.4.

The results reported in Column III of Table 3.6 show that the asymmetric responses to good and bad interest rate news before the adoption of SFAS 133 for firms with higher underlying earnings volatility and for firms with lower underlying earnings volatility is 0.4790 and 0.0064, respectively. This 0.3159 difference is significant. After including firm dummies in the regression, the results reported in Column IV of Table 3.6 continue to support the results presented in Table 3.5.

The results reported in Column IV of Table 3.6 show, the asymmetry of responses to good and bad interest rate news for firms with higher earnings volatility decreased from 0.3159 in the pre-SFAS 133 period to 0.2076 in the post-SFAS 133 period. This decline of 0.2076 is statistically significant. In contrast, the asymmetry of responses for firms with lower earnings volatility decreased from 0.1631 in the pre-SFAS 133 period to 0.0828 in the post-SFAS 133 period, which is not statistically different from zero. After including firm dummies in the regression, the results reported in Column

IV of Table 3.6 generally show consistent results with this findings.

Table 3.6: *Investors' Responses to Good and Bad Interest Rate News, SFAS 133, and Earnings Volatility: 1999 to 2001 as a transition period*

		Coefficient Estimates			
	Predicted sign	I	II	III	IV
GNEWS	+	0.2114***	0.2413***	0.2337***	0.2674***
		(21.95)	(23.70)	(20.58)	(22.23)
BNEWS	-	-0.3549***	-0.3279***	-0.3001***	-0.2699***
		(-37.30)	(-32.60)	(-26.48)	(-22.49)
POST	+	0.0001	0.0010***	0.0002	0.0012***
		(0.46)	(3.17)	(1.33)	(3.46)
VOLT	-			-0.0001	
				(-0.32)	
GNEWS*POST	+	0.0430**	0.0470***	0.0159	0.0174
		(2.46)	(2.58)	(0.79)	(0.82)
BNEWS*POST	±	0.0130	0.0163	-0.0298	-0.0280
		(0.73)	(0.86)	(-1.44)	(-1.28)
POST*VOLT	±			-0.0003	-0.0006
				(-0.91)	(-0.64)
GNEWS*VOLT	±			-0.0706***	-0.0894***
				(-3.29)	(-3.96)
BNEWS*VOLT	±			-0.1789***	-0.1946***
				(-8.56)	(-8.84)
GNEWS*POST*VOLT	±			0.0909**	0.1043**
				(2.28)	(2.49)
BNEWS*POST*VOLT	±			0.1306***	0.1362***
				(3.14)	(3.11)
SIZE	±	0.0001***	-0.0013***	0.0001*	-0.0012***
		(2.75)	(-6.72)	(1.92)	(-6.66)
BTM	±	0.0005***	-0.0001	0.0004***	-0.0001
		(4.71)	(-0.32)	(3.74)	(-0.35)
LEV	±	-0.0001	-0.0017*	0.0001	-0.0017*
		(-0.28)	(-1.66)	(0.47)	(-1.65)
VIX	±	-0.0000**	-0.0000***	-0.0000***	-0.0000**
		(-2.26)	(-3.66)	(-3.58)	(-2.26)
INTERCEPT	±	-0.0006**		-0.0005*	
		(-2.11)		(-1.91)	
Firm-fixed-effects			Yes		
No. of Observations		763,675	763,675	763,675	763,675
R^2		0.40%	0.74%	0.40%	0.75%

The table reports regression coefficient estimates and (in parentheses) t-statistics. Between 1999 and 2001 is used as a transition period. Firm-fixed-effects are included in the regression reported in columns II and IV of the table, respectively. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Thirdly, I partitioned the overall sample into two periods: between 1990 and 2000 (pre-SFAS 133 period) and between 2002 and 2009 (post-SFAS 133). I estimated the coefficients for equation (3.4) and equation (3.5) for the pre-SFAS 133 period subsample and the post-SFAS 133 period subsample separately. The results reported in Panel B of Table 3.7 show that the asymmetric responses to good and bad interest rate news decreased from 0.1525 in the pre-SFAS 133 period to 0.0876 in the post-SFAS 133 period. This decline is statistically significant. The results presented in Panel B of Table 3.8 show that the asymmetry of responses to good and bad news has decreased more for firms with higher earnings volatility that for firms with lower earnings volatility. Specifically, the asymmetric responses to good and bad interest rate news decreased from 0.3077 in the pre-SFAS 133 period to 0.1086 in the post-SFAS 133 period and from 0.0848 in the pre-SFAS 133 period to 0.0786 in the post-SFAS 133 period for firms with high earnings volatility and firms with lower earnings volatility, respectively. Consequently, consistent with my predications, the results show that investors' asymmetric response to good and bad interest rate news is more pronounced in the pre-SFAS 133 period than in the post-SFAS 133 period. Moreover, the asymmetric responses to good and bad interest rate news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility.

Table 3.7: *Investors' Responses to Good and Bad Interest Rate News and SFAS 133*

Panel A: Coefficient Estimates

Variables		Pre-SFAS 133		Post-SFAS 133	
	Predicted sign	I	II	III	IV
GNEWS	+	0.2090***	0.2382***	0.2541***	0.2915***
		(19.08)	(20.67)	(21.69)	(23.89)
BNEWS	-	-0.3615***	-0.3360***	-0.3417***	-0.3088***
		(-33.91)	(-29.97)	(-27.62)	(-23.97)
SIZE	±	0.0001	-0.0021***	0.0000	-0.0020***
		(1.25)	(-5.44)	(0.41)	(-6.15)
BTM	±	0.0005***	0.0003	0.0004***	-0.0015***
		(3.60)	(0.42)	(2.94)	(-2.59)
LEV	±	-0.0005	-0.0025	0.0005	-0.0044***
		(-1.20)	(-1.14)	(1.53)	(-2.60)
VIX	±	-0.0001***	-0.0000	-0.0000	-0.0000***
		(-3.86)	(-0.54)	(0.62)	(-2.91)
INTERCEPT	±	0.0001		-0.0012***	
		(0.33)		(-3.61)	
Firm-fixed effects			Yes		Yes
Observations		421,558	421,558	349,880	349,880
R^2		0.40%	0.75%	0.40%	0.80%

Panel A of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. Firm-fixed-effects are included in the regression reported in columns II and IV of the table. All variables are defined as before. ***, ***, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Investors' Responses to Good and Bad Interest Rate News Before and After SFAS 133

Variables	Before (POST= 0)	After (POST= 1)	Difference (After – Before)
GNEWS	0.2090	0.2541	0.0451
BNEWS	-0.3615	-0.3417	0.0198
Difference (|BNEWS| – GNEWS)	0.1525***	0.0876***	-0.0651**

Panel B of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Table 3.8: *Investors' Responses to Good and Bad Interest Rate News, SFAS 133, and Earnings Volatility*

Panel A: Coefficient Estimates

Variables		Pre-SFAS 133		Post-SFAS 133	
	Predicted sign	I	II	III	IV
GNEWS	+	0.2301***	0.2632***	0.2504***	0.2880***
		(17.84)	(19.99)	(18.56)	(20.51)
BNEWS	-	-0.3149***	-0.2874***	-0.3290***	-0.2959***
		(-24.94)	(-21.60)	(-23.28)	(-20.11)
VOLT	-	-0.0001	-0.0003		
		(-0.35)	(-1.4)		
GNEWS*VOLT	±	-0.0677***	-0.0853***	0.0192	0.0140
		(-3.21)	(-3.35)	(0.71)	(0.49)
BNEWS*VOLT	±	-0.1560***	-0.1672***	-0.0492	-0.0555*
		(-2.79)	(-6.77)	(-1.70)	(-1.82)
SIZE	±	0.0000	-0.0021***	0.0001**	0.0020
		(0.56)	(-5.39)	(2.22)	(-6.15)
BTM	±	0.0004***	0.0003	0.0003**	-0.0015***
		(2.76)	(0.44)	(2.47)	(-2.60)
LEV	±	-0.0002	-0.0026	0.0006*	-0.0044***
		(0.51)	(-1.18)	(1.80)	(-2.61)
VIX	±	-0.0001***	-0.0000	-0.0000	-0.0001***
		(-3.76)	(-0.59)	(-0.59)	(-2.90)
INTERCEPT	±	0.0002***		-0.0011***	
		(0.52)		(-3.07)	
Firm-fixed effects			Yes		Yes
No. of Observations		421,564	421,564	349,881	349,881
R^2		0.44%	0.75%	0.43%	0.80%

Panel A of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. Firm-fixed-effects are included in the regression reported in columns II and IV of the table. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Investors' Responses to Good and Bad Interest Rate News, SFAS 133, and Earnings Volatility

Variables		L_VOLT (VOLT= 0)	H_VOLT (VOLT= 1)	Difference (High-Low)
Before (POST=0)	GNEWS	0.2301	0.1632	-0.0674
	BNEWS	-0.3149	-0.4709	-0.1560
	Difference (|BNEWS| – GNEWS)	0.0848***	0.3077***	0.2229***
After (POST=1)	GNEWS	0.2504	0.2696	0.0192
	BNEWS	-0.3290	-0.3782	-0.0492
	Difference(|BNEWS| – GNEWS)	0.0786***	0.1086***	0.0273***
	Difference (after) - Difference (before)	-0.0062	-0.1991***	
After - Before	GNEWS	0.0203	0.1064***	
	BNEWS	-0.0141	0.0927***	

Panel B of the table reports the coefficient estimates for investors' responses to good and bad interest rate news before and after the SFAS 133 period. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5% and 10% levels, respectively.

Finally, prior studies (e.g., Petersen 2009) suggest that in regression analyses with panel data, the residuals may be correlated across firms and across time, and OLS standard errors can be biased. To adjust the standard errors for residual correlation (both within firms over time, and across firms each time period), Petersen (2009) suggests to estimate the standard errors with clustering along multiple dimensions (firm and year). As my sample comprises panel data, I test whether my results are sensitive for residual correlation. Using the approach discussed by Petersen 2009, I estimate the standard errors with clustering along multiple dimensions (firm and year). Untabulated results reinforces the evidence obtained in the main analysis.

3.7 Summary and conclusion

The purpose of this study is to investigate whether the quality of accounting recognition and disclosures affects investors' responses to good and bad interest rate news. In addition, I analyze the variation in the effect of the quality of accounting recognition and disclosures on investors' responses to good and bad interest rate news between firms with higher or lower earnings volatility. I develop three hypotheses: (1) investors respond more asymmetrically to good and bad interest rate news before SFAS 133 adoption than after SFAS 133 adoption, (2) the asymmetry of responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher earnings volatility than for firms with lower earnings volatility, (3) the asymmetry of responses to good and bad interest rate news after the adoption of SFAS 133 decreases more for firms with higher earnings volatility than for firms with lower earnings volatility. Consistent with my predictions, I find a significant decrease in the asymmetry of responses to good and bad interest rate news following the adoption of SFAS 133. Following Epstein and Schneider (2008), I interpret this finding as an indication that higher quality of accounting recognition and disclosures indeed decreases uncertainty about the precision of information that investors receive.

As a result, investors discount good interest rate news less heavily after the adoption of SFAS 133. I also find that the asymmetry of responses to good and bad interest rate news before the adoption of SFAS 133 is greater for firms with higher earnings volatility than for firms with lower earnings volatility. This implies that uncertainty about the precision of information for firms with higher earnings volatility is higher than for firms with lower earnings volatility. Lastly, I find that the asymmetry of responses to good and bad interest rate news significantly decreases for firms with higher earnings volatility in the post-SFAS 133 period. In contrast, the adoption of SFAS 133 has no impact on the asymmetry of responses to good and bad interest rate news for firms with lower earnings volatility. This is consistent with the idea that investors demand more accounting information when underlying earnings volatility is higher.

These findings contribute to the literature by showing that the quality of accounting recognition and disclosure affects investors' responses to good and bad interest rate news. Moreover, the study contributes to the literature by showing that the cross-sectional variation in earnings volatility affects the impact of SFAS 133 on investors' responses to good and bad interest rate news. Finally, the findings contribute to the general debate about the effectiveness of SFAS 133 by showing that SFAS 133 indeed decreases information ambiguity.

4

The impact of accounting for derivatives on income smoothing

4.1 Introduction

One of the major criticisms of SFAS 133 is that the restrictive nature of the standard induces higher earnings volatility and thus may encourage more earnings smoothing (e.g., Ostenand 2000; Sapra 2002). While prior studies document that SFAS 133 has increased the transparency and visibility of derivative instruments (e.g., Ahmed et al. 2011; Chapter 2 of this dissertation), there are few studies that examine the question whether SFAS 133 affects earnings volatility and earnings smoothing. Thus, the main purpose of this study is to provide empirical evidence with regard to this question. Specifically, I examine whether the adoption of SFAS 133 influences firms' income smoothing via discretionary accruals decisions. Moreover, I investigate whether the degree of hedge ineffectiveness and market instability affect the impact of SFAS 133 on firms' income smoothing via discretionary accruals decisions. This study differs from prior studies by examining directly the impact of the adoption of SFAS 133 on income smoothing via discretionary accruals. Most importantly, this study differs from prior studies by examining the influence of the degree of hedge ineffectiveness and market instability on the impact of SFAS 133 on firms' income smoothing via discretionary accruals decisions.

Empirical evidence on the impact of SFAS 133 on earnings volatility and thus earnings smoothing is important because of the controversy surrounding SFAS 133. Proponents of SFAS 133 argue that it provides shareholders with better information and reduces opportunities for managers to smooth earnings (Alkon 2006). Critics, however, argue that SFAS 133 induces higher earnings volatility and thus more income smoothing (e.g., Osterland 2000). This volatility arises because SFAS 133 requires firms to report the ineffective portion of derivatives gains and losses in the income statement immediately, but gains and losses of the hedged items later. This hedge mismatch will cause higher earnings volatility in the short term. Although SFAS 133 allows firms to apply hedge accounting if the hedge qualifies for hedge accounting[1], it cannot completely mitigate the accounting mismatch. Because the volatility in earnings is costly for managers and shareholders in various ways, managers face huge pressures to smooth earnings (Trueman and Titman 1988; Longstaff and Piazzesi 2004). For example, Trueman and Titman (1988) point out that high earnings volatility increases the perceived risk of bankruptcy of a firm and thus its cost of capital. Similarly, smooth earnings leads to more analysts following (Schipper 1997), meeting analyst forecasts more often (Myers et al. 2007), meeting bonus targets (Fudenberg and Tirole 1995), lower firm risk perceived by investors (Graham et al. 2005), lower taxes and agency costs and higher management wealth (Carlson and Bathala 1997; Barton 2001), and higher firm value (Longstaff and Piazzesi 2004). Hence, earnings smoothing can be viewed as a tool to avoid the undesirable consequences of earnings volatility. Previous studies document that managers make use of discretionary accruals and/or derivative instruments to smooth earnings (e.g., Watts and Zimmerman 1986; Myers and Skinner 1999; Barton 2001). Barton (2001) suggests that managers view earnings smoothing via discretionary accruals and derivative instruments as substitutes. Because gains and losses on derivative instruments recognition under SFAS 133 increases earnings volatility and such volatility in earnings is costly for managers and shareholders, managers may engage in income smoothing via discretionary accruals. Thus, I expect income smoothing via discretionary accruals to increase significantly after the adoption of SFAS 133.

Following prior studies, I use the correlation between the changes in managed earnings and the changes in unmanaged earnings as a measure of income smoothing via discretionary accruals (e.g., Tucker and Zarowin 2006; Grant et al. 2009). A higher negative correlation (hereafter SMOOTH) indicates more income smoothing. Like Grant et al. (2009), I use the inverted sign of the SMOOTH for ease of interpretation, so that larger coefficients indicate higher income smoothing.

Analyzing a sample of 215,874 firm-year observations in the period from 1992 to 2006, I find a significant increase in income smoothing via discretionary accruals after the adoption of SFAS 133. The significant increase in income smoothing via discre-

[1] Formal documentation of the hedging relationship and hedging effectiveness tests (e.g., prospective and retrospective tests) are required (SFAS 133).

tionary accruals activity after the adoption of SFAS 133 is a potential explanation for why prior empirical studies did not find the largely expected increase in earnings volatility after the implementation of SFAS 133 (e.g., Zhang 2009). I also examine whether ineffective hedgers engage in more income smoothing via discretionary accruals than effective hedgers because the degree of the earnings volatility depends on the effectiveness of the hedge (Bies 2005). I designate a firm as an ineffective hedger if it reports gains or losses due to hedge ineffectiveness after the adoption of SFAS 133. I find that income smoothing via discretionary accruals is significantly higher for ineffective hedgers than effective hedgers after the implementation of SFAS 133. This result indicates that ineffective hedgers are more affected by SFAS 133 than effective hedgers. Finally, I examine whether market volatility affects the impact of SFAS 133 on income smoothing via discretionary accruals. Greater market volatility will make the documentation of the hedging relationship and hedging effectiveness tests (e.g., prospective test) more difficult for firms to qualify for hedge accounting because they cannot easily anticipate changes in fair value of derivatives and changes in fair value of hedged items. Thus, I expect that the higher the level of market instability, the stronger income smoothing via discretionary accruals after the adoption of SFAS 133. Consistent with my prediction, I find that the higher the market volatility, the stronger income smoothing via discretionary accruals after the implementation of SFASS 133, which implies that higher market instability indeed makes it more difficult for firms to meet hedge accounting requirements which therefore increases unmanaged earning volatility and income smoothing. The results are robust to controlling for industry differences, an alternative measure of income smoothing, and to the inclusion of additional control variables (e.g., corporate governance and macro-economic factors).

This study contributes to the literature in several ways. First, by providing empirical evidence that SFAS 133 induces higher unmanaged earnings volatility and consequently income smoothing via discretionary accruals, this paper contributes to the general debate about whether SFAS 133 affects earnings volatility and income smoothing. Prior studies on the impact of SFAS 133 on earnings volatility show that SFAS 133 does not affect earnings volatility (e.g., Zhang 2009). However, prior studies do not take managers' earnings smoothing behavior into account. Second, this study extends Barton's (2001) study by providing empirical evidence on the impact of SFAS 133 on income smoothing via discretionary accruals. The findings of this study support Barton's (2001) assumption that managers use discretionary accruals to smooth earnings after the implementation of SFAS 133. Third, this study helps standard setters and regulators to consider the trade-off between increased transparency and income smoothing. Finally, by showing the unintended consequences of the accounting treatment for derivative instruments and hedging activities under SFAS 133, this study contributes to empirical studies on the effect of accounting recognition and disclosure regulation (Healy and Palepu 2001).

The remainder of this study is structured as follows. The next section reviews previous studies. Section 4.3 describes the theory and develops the hypotheses. Section 4.4 presents the research design. Section 4.5 presents sample selection and descriptive statistics. Section 4.6 discusses the main results. Section 4.7 provides a brief summary and conclusion.

4.2 Literature review

There are two strands of literature related to this paper: the first attempts to provide reasons for income smoothing, and the second concerns the impact of SFAS 133 on earnings volatility.

Income smoothing refers to managers' actions to use their reporting discretion to reduce the fluctuations in their reported net earnings towards an expected level (Tucker and Zarowin, 2006). With respect to income smoothing activities, previous studies indicate that firms can use artificial smoothing and real smoothing. Artificial smoothing specifically refers to accounting manipulation (i.e., using accounting procedures to shift expenses and/or revenues over time without direct cash flow consequences) to smooth earnings. On the other hand, real smoothing involves the deliberate choice and timing of transactions that can affect cash flows and control underlying economic events (e.g., alerting a firm's production and/or investment decisions at year end based on knowledge of how the firm has performed up to that time in the year). Since managers use artificial smoothing and real smoothing as substitutes to smooth earnings (Barton 2001), I investigate income smoothing via accounting manipulation (i.e., artificial smoothing).

Previous studies have suggested various motivations for income smoothing. One of the early studies on income smoothing suggested that it enhances investors' and creditors' confidence of management, enhances the relation between managers and workers, and reduces corporate tax liability (Hepworth 1953). In addition to the reasons above, Gordon (1964) suggested that stable earnings increase stockholders' satisfaction because stable earnings make predictions about future earnings easier. Trueman and Titman (1988) also show that managers smooth earnings to increase stock prices. They argue that smooth earnings lower the assessment of the possibility of bankruptcy and thus decrease the firm's cost of borrowing. This will lead to an increase in the attractiveness of the firm to investors. Another theoretical study by Froot and Stein (1993) predict that smooth cash flows increase firm value by lowering the firm's reliance on costly external capital. Consistent with this prediction, Minton and Schrand (1999) find evidence that higher cash flow volatility is associated with higher costs of accessing external capital and a lower level of investment in capital expenditures, R&D and advertising.

Albrecht and Richardson (1990) provide empirical evidence on whether income smoothing exists and its distribution across different industries. Analyzing a sample

of 128 core companies and 128 peripheral companies from 1974 to 1985, they find that income smoothing exists and that it is fairly evenly distributed across industries. Recently, using a comprehensive survey of top executives, Graham et al. (2005) find that almost 97% of respondents prefer a smooth earnings path. The primary reasons for working towards smooth earnings are that CFOs believe that investors perceive firms with smoother earnings as less risky and thus demand a smaller risk premium. Moreover, they find that CFOs believe that smoother earnings make it easier for analysts and investors to project future earnings and that this leads to a higher stock price. Francis et al. (2005) also find that firms with higher income smoothing have a lower cost of capital, even after controlling for cash flow volatility.

Other motivations for income smoothing are related to managers' compensation and job security. Prior analytical literature on job security as an incentive for managers to smooth earnings suggests that managers experiencing poor (good) performance in the current (next) period have an incentive to use discretionary accruals to increase current period earnings to avoid being dismissed in the current period. Conversely, managers experiencing good (bad) performance in the current (next) period, have an incentive to use discretionary accruals to decrease current period earnings to avoid being dismissed in the next period (Fudenberg and Tirole 1995). Consistent with this theory, DeFond and Park (1997) find that managers experiencing good (poor) performance in the current period and expecting poor (good) performance in the next period make income-decreasing (income-increasing) discretionary accruals in order to reduce the threat of being dismissed. The results thus suggest that managers smooth earnings in consideration of both current and future relative performance.

Two studies that are closely related to my study are Singh (2004) and Zhang (2009). Singh (2004) examines the influence of SFAS 133 on earnings and cash flow volatility. Analyzing a sample of 305 non-financial, non-regulated Fortune 500 companies from 2000 to 2001, he finds that SFAS 133 has no significant effect on earnings and cash flow volatility. Similarly, Zhang (2009) examines changes in firms' risk exposure, cash flow volatility, and earnings volatility after the adoption of SFAS 133 for effective hedgers and speculators or ineffective hedgers. He finds that neither effective hedgers nor speculators or ineffective hedgers experience a significant change in earnings volatility after the adoption of SFAS 133.

Although prior studies provide useful insights, there are very few that examine the impact of accounting for derivatives (i.e., SFAS 133) on earnings volatility and income smoothing. Most importantly, there is no study, to the best of my knowledge, that examines the influence of the degree of hedge ineffectiveness and market instability on the impact of SFAS 133 on income smoothing. This study thus takes a first step to fill the evident gap in the literature by examining the impact of accounting for derivatives (i.e., SFAS 133) on earnings volatility and income smoothing and by investigating the influence of the degree of hedge ineffectiveness and market instability on the impact of SFAS 133 on income smoothing.

4.3 Theory and hypotheses

4.3.1 SFAS 133 and income smoothing

Prior studies suggest that earnings volatility is not preferable to shareholders and managers for several reasons (e.g., Trueman and Titman 1988; Defond and Park 1997). Consistent with this view, several studies show that less volatile earnings (smooth earnings) lower the actual or perceived riskiness of firms (Trueman and Titman 1988; Michelson et al. 2000), increase analysts following and improve firm value (Lang et al. 2003), give owners and creditors more confidence in management (Hepworth 1953), increase managerial compensation and wealth (Barton 2001), and attract more institutional investors (Badrinath et al. 1989). Thus, managers have strong incentives to report smooth earnings.

SFAS 133 requires companies to recognize all derivative instruments as either assets or liabilities on the balance sheet at fair value and to adjust their earnings to reflect changes in the market value. Much of the controversy surrounding SFAS 133 concerns the possibility that the standard increases earnings volatility. Under the previous standards, firms could hide ineffective hedges on the balance sheet by deferring the effects on earnings. SFAS 133, however, exposes such hedges by requiring firms to measure and record all ineffectiveness in the income statement. For a derivative designated as a fair value hedge (i.e, hedging the exposure to changes in the fair value of a recognized asset or liabilities), a firm can recognize the changes in the fair value of the hedged item and derivative instruments in the income statement simultaneously (SFAS 133 paragraph 22). For a derivative designated as a cash flow hedge (i.e., hedging the exposure to variable cash flows of a forecasted transaction), the effective portion of the derivative instrument's gains and losses is initially reported as a component of other comprehensive income and subsequently reclassified to earnings when the forecasted transaction affects earnings.[2] The ineffective portion of the gains and losses is reported in earnings immediately (SFAS 133 paragraph 30). Thus, any speculative position or hedge ineffectiveness will affect current period earnings because there is no offsetting adjustment from the hedged item. This hedge mismatch will induce higher earnings volatility. Much of the anecdotal evidence confirms the concern about the impact of SFAS 133 on earnings volatility: almost 62% of over 250 comment letters on the Exposure Draft noted that earnings volatility would increase (Ronnie 2001). The following comment is typical:

> *Given the focus on earnings by analysts and shareholders, the earnings volatility potential presented by fair value hedge accounting, as proposed (by SFAS 133), may have a material impact on market valuation as well.* [Providian Bancrop]

[2] A hedge is highly effective if changes in fair value or cash flow of the hedged item and the hedging derivative offset each other to a significant extent.

Consequently, managers had huge pressure to smooth earnings after the adoption of SFAS 133. Previous studies document that managers make discretionary accounting choices and/or use derivative instruments to reduce earnings volatility (Barton 2001; Watts and Zimmerman 1986; Myers and Skinner 1999). Barton (2001) shows, for example, that managers view derivatives and discretionary accruals as substitutes to smooth earnings. Because gains and losses on derivative instruments recognition under SFAS 133 increases earnings volatility and the volatility in earnings volatility is costly for managers and shareholders, managers will likely engage in income smoothing via discretionary accruals.

In this study, therefore, I posit that because SFAS 133 induces higher earnings volatility, firms will engage in more income smoothing via discretionary accruals after the adoption of SFAS 133. To assess the effect of SFAS 133 on income smoothing via discretionary accruals, I test the following hypothesis:

H1: Income smoothing via discretionary accruals increases after the adoption of SFAS 133.

4.3.2 SFAS 133, type of hedgers, and income smoothing

My second hypothesis tests whether the impact of SFAS 133 on income smoothing via discretionary accruals depends on the effectiveness of the hedge. SFAS 133 allows firms to use hedge accounting. The purpose of hedge accounting is to reduce earnings volatility by allowing firms to report gains and losses on the derivative instruments in the income statement in the same period as offsetting losses and gains on the hedged items. However, to qualify for hedge accounting, formal documentation of the hedging relationship and hedge effectiveness tests at the inception and throughout the term of the hedge relationship must be met (SFAS 133).[3] Because ineffective hedgers do not meet hedge effectiveness criteria, they are more likely to report more gains and losses on derivative instruments in earnings immediately but losses and gains of the hedge item later than effective hedgers. This creates a significant mismatch in the timing of gains and losses recognition and thus induces higher potential earnings volatility for ineffective hedgers than effective hedgers. Susan Bies, former member of the Board of Governors of the Federal Reserve, notes that the degree of the earnings volatility depends on the effectiveness of the hedge (Bies 2005).

Following the above discussion, I expect that ineffective hedgers are more likely to be engaged in more income smoothing via discretionary accruals than effective hedgers after the adoption of SFAS 133. To assess whether the effect of SFAS 133 on income smoothing via discretionary accruals varies between effective hedgers and ineffective hedgers, I test the following hypothesis:

[3]For example, the ratio of change in the value of hedged item and its hedging instruments should fall between 80% and 125% (SFAS 133).

H2: Income smoothing via discretionary accruals is higher for ineffective hedgers than effective hedgers after the adoption of SFAS 133.

4.3.3 SFAS 133, market instability, and income smoothing

My third hypothesis tests whether market instability affects the influence of SFAS 133 on income smoothing via discretionary accruals. As mentioned above, SFAS 133 requires proper documentation of the hedging relationship and hedge effectiveness tests (e.g., a retrospective test and a prospective test) to apply hedge accounting. Larger market volatility will make the documentation of the hedging relationship and effectiveness tests more difficult because firms cannot easily anticipate the changes in fair value of the derivative instruments and the changes in fair value of the hedged items. Moreover, larger market volatility causes larger fluctuations in market values of assets and liabilities. If firms do not apply hedge accounting, it will lead to a significant increase in earnings volatility.

Hence, I posit that the higher the level of market instability, the higher income smoothing via discretionary accruals after the adoption of SFAS 133. To assess the effect of market instability on the influence of SFAS 133 on income smoothing via discretionary accruals, I test the following hypothesis:

H3: The higher market instability, the stronger income smoothing via discretionary accruals after the adoption of SFAS 133.

4.4 Research design

I argue that SFAS 133 influences firms' income smoothing via discretionary accruals decisions. From this perspective, I assume that income smoothing via discretionary accruals can be presented in the following form:

$$\textit{Income smoothing} = f(\textit{SFAS 133, control variables}) \tag{4.1}$$

4.4.1 Variable measurement

Dependent variable: income smoothing

Consistent with prior studies (e.g., Tucker and Zarowin 2006; Grant et al. 2009), I use the correlation between changes in managed earnings(ΔME) and changes in unmanaged earnings(ΔUME) as a measure of income smoothing. Based on the modified Jones model, I estimate discretionary accruals. The model is:

$$TACC = \beta_0 + \beta_1(1/TAL) + \beta_2(\triangle Sale - \triangle AR) + \beta_3 PPE + \beta_4 ROA + \xi \tag{4.2}$$

TACC is total accruals, which is defined as changes in non-cash current assets minus changes in current labilities, excluding the current portion of long-term debt,

minus depreciation and amortization[4]; change in sales ($\Delta Sale$); change in account receivables (ΔAR); and gross property, plant and equipment (PPE) are each deflated by lagged total assets (TAL) to control for potential scaling biases. The ($\Delta Sale$ - ΔAR) term controls for normal level of working capital accruals related to sales; the PPE term controls for normal levels of depreciation expense and related deferred tax accruals. I include ROA as an additional control variable because prior studies suggest that the Jones model is misspecified for well-performing or poorly-performing firms (Dechow et al. 1995; Kothari et al. 2005).

Consistent with prior studies (e.g., Barton 2001), I estimate equation (4.2) cross-sectionally for each sample fiscal year and two-digit SIC code using ordinary least squares regression. I use the residual values of regression equation (4.2) as a measure of discretionary accruals (DA). Like Tucker and Zarowin (2006), I determine the unmanaged earnings (UME) as net income (NI) minus discretionary accruals (UME = NI - DA). My measure of income smoothing is the correlation between changes in discretionary accruals (managed earnings) and changes in pre-discretionary income (unmanaged earnings): Corr(ΔME;ΔUME), using three-year observations. A more negative correlation indicates higher income smoothing (Tucker and Zarowin 2006). Thus, a lower value SMOOTH indicates that managers exercise accounting discretion to smooth reported earnings. In my analyses, I use the inverted sign of SMOOTH for ease of interpretation, where larger coefficients indicate higher income smoothing.

Explanatory variables

My primary explanatory variables consist of two indicator variables and one continuous variable. The first indicator variable (POST) captures whether the fiscal year falls after the adoption of SFAS 133, and takes the value of one for fiscal years ending after the adoption of SFAS 133, and zero otherwise. The second indicator variable (CLASS) captures whether a firm is classified as an ineffective hedger, and takes the value of one if a firm is classified as an ineffective hedger, and zero otherwise. A firm is classified as ineffective hedger if it reports derivative gains or losses due to hedging ineffectiveness in the POST period. The third variable (VIX) measures market volatility. It is based on the implied volatilities of options, where larger values indicate higher market instability.

Control variables

I include a number of control variables in my regression analyses based on variables identified in prior literature that are related to income smoothing. Prior research indicates that factors such as managerial compensation and self-interest, pressure from the capital market, corporate governance characteristics, debt covenants, macroeconomic factors, and firm characteristics may influence managers' income smoothing behavior

[4]I find similar results using earnings before extraordinary income minus operating cash flows as a measure of TACC.

(Carlson and Bathala 1997; Leuz et al. 2003; Tucker and Zarowin 2006). I control for market volatility which is the Chicago Board Options Exchange (CBOE) volatility index (VIX) measured at the end of the fiscal year. I control for a compensation variable that may induce opportunistic behavior in managers. I use a dollar change in the portfolio value of stock and option due to a percentage change in stock price (STP) to control for managers' compensations. Given the findings in prior studies (e.g., Grant et al. 2009), I expect a positive association between income smoothing and the compensation variable. I control for debt covenants (LEV) because prior studies find that firms close to violating lending covenants increase income (rather than smooth) in order to avoid such a violation (Dechow et al. 1996). Return on assets (ROA) is used to control for firm profitability because managers' ability to smooth earnings is limited by the firm's profit potential (Trueman and Titman 1988; Carlson and Bathala 1997). Firms that experience poor performance tend to find fewer instruments available with which to smooth earnings. This suggests that the higher the firm's profitability, the greater the potential for earnings smoothing. I measure ROA as the ratio of net income to total assets. Like Richardson et al. (2002), I use the ratio of total liabilities to total assets. I control for growth opportunities (BTM) because growth firms more likely smooth earnings than value firms because growth firms usually have higher accruals (e.g., due to higher investment levels) which provides them with more discretion for income smoothing. I define BTM as the ratio of a firm's book value to market value of equity. I control for firm size (SIZE) because large firms are more closely monitored than small firms and thus smooth less. I measure SIZE as the natural logarithms of the market value of equity. I control for time trend (TIMEY), measured as the rank of the financial reporting dates.

4.4.2 Hypotheses test

SFAS 133 and income smoothing

I use the following regression equation (4.3) to test whether income smoothing via discretionary accruals experiences a significant change after the adoption of SFAS 133 (i.e., Hypothesis 1):

$$SMOOTH = \alpha_0 + \alpha_1 POST + \alpha_2 VIX + \alpha_3 STP + \alpha_4 LEV + \alpha 5 ROA + \alpha_6 BTM + \alpha_7 SIZE + \alpha_8 TIMEY + \varepsilon \quad (4.3)$$

All variables are defined as before.

SFAS 133, type of hedgers, and income smoothing

I estimate the following regression equation (4.4) for the post-SFAS 133 period to test whether income smoothing via discretionary accruals is higher for ineffective hedgers than for effective hedgers after the adoption of SFAS 133 (i.e., Hypothesis 2):

$$SMOOTH = \beta_0 + \beta_1 CLASS + \beta_2 VIX + \beta_3 STP + \beta_4 LEV + \beta_5 ROA + \beta_6 BTM + \beta_7 SIZE + \beta_8 TIMEY + \xi \quad (4.4)$$

All variables are defined as before.

SFAS 133, market volatility, and income smoothing

To test whether income smoothing via discretionary accruals increases with market instability after the adoption of SFAS (i.e., Hypothesis 3), I estimate the following regression equation (4.5):

$$SMOOTH = \alpha_0 + \alpha_1 POST + \alpha_2 VIX + \alpha_3 POST^* VIX + \alpha_4 STP + \alpha_5 LEV + \alpha_6 ROA + \alpha_7 BTM + \alpha_8 SIZE + \alpha_9 TIMEY + \omega \quad (4.5)$$

All variables are defined as before.

I employ two different regression models to test equation 4.3, 4.4 and 4.5. The first is an OLS regression. I also use a second regression model. This second model is fixed-effects model, where I include firm dummies in the regressions. This allows me to control for unobserved firm effects (fixed effects) on income smoothing that are assumed to be constant through time but vary across firms (Wooldridge 2002).

4.5 Sample selection and descriptive statistics

4.5.1 Sample selection and data sources

My analyses are based on a sample of U.S. firms over the period of 1992 to 2006. My sample begins in 1992 because this is the first year executive compensation data became available on Compustat, and ends in 2006 because it enhances comparability with prior studies.[5] I obtained market security data from the Center for Research in Security Prices (CRSP) database. Financial accounting data along with the reporting dates was collected from Compustat North America database. I obtained executive compensation data from Execucomp. Market Volatility Index data was collected from the Chicago Board Options Exchange (CBOE) website.

To mitigate the influence of outliers, all variables are winsorized at the 0.5 and 99.5 percentiles. I deleted observations with missing values and observations that are from the transition period. The final sample consists of 215,874 firm-year observations over the period of 1992 to 2006. Table 4.1 reports the sample composition by industry.

[5] In the sensitivity test, I extended the sample period from 2006 to 2009 and find results consistent with my main findings.

Table 4.1: *Composition of Sample by Industry**

Industry-type	No. of firm-year	Percent	Industry-type	No. of firm-year	Percent
BusSv	18931	8.77	Books	3566	1.65
Rtail	15388	7.13	ElcEq	2842	1.32
Chips	14573	6.75	Cnstr	2076	0.96
Enrgy	9875	4.57	Txtls	2055	0.95
Drugs	9562	4.43	Fun	2019	0.94
Mach	9498	4.40	PerSv	1915	0.89
Insur	8606	3.99	Misc	1601	0.74
Comps	8559	3.96	Toys	1538	0.71
Chems	8099	3.75	Aero	1516	0.70
Whlsl	8087	3.75	Rubber	1488	0.69
Trans	6543	3.03	Banks	1282	0.59
Steel	5934	2.75	Gold	1161	0.54
Paper	5908	2.74	Boxes	1126	0.52
MedEq	5497	2.55	Beer	1056	0.49
Food	5421	2.51	Mines	1038	0.48
BldMt	5230	2.42	Soda	620	0.29
Meals	5191	2.40	FabPr	616	0.29
Hshld	5190	2.40	Guns	612	0.28
Autos	5041	2.34	Agriculture	504	0.23
Telcm	4672	2.16	Smoke	466	0.22
Util	4643	2.15	Ships	413	0.19
LabEq	4140	1.92	Coal	145	0.07
Fin	4046	1.87	RlEst	20	0.01
Clths	3981	1.84	Total	215,984	100
Hlth	3584	1.66			

*I use the Fama and French 48 industry classification.

4.5.2 Descriptive statistics

Table 4.2 reports descriptive statistics of the key variables used in the regression analyses for the whole sample. Of the total 215,985 firm-year observations, 49.5% of my sample (106,794 firm-year observations) is from the pre-SFAS 133 period, while the remaining 50.5% (109,080 firm-year observations) is from the post-SFAS 133 period.

Table 4.2: *Descriptive Statistics for Variables Used in Regression Analyses*

Variables	N	Minimum	Mean	Median	Std	Maximum
SMOOTH	215,984	-1.000	0.010	-0.092	0.879	1.000
POST	215,984	0.000	0.506	1.000	0.500	1.000
VIX	215,984	11.250	19.747	20.920	5.923	28.620
CLASS	109,192	0	0.051	0	0.219	1
STP	215,984	0.000	5.370	5.404	1.555	8.161
LEV	215,984	0.000	0.217	0.210	0.164	0.559
ROA	215,984	-0.917	0.031	0.049	0.124	0.166
BTM	215,984	-2.689	0.454	0.419	0.383	1.207
SIZE	215,984	2.956	7.324	7.266	1.584	10.301
TIMEY	215,984	4.000	11.217	12.000	3.560	17.000

The full sample comprises of 215,984 firm-year observations from financial and nonfinancial firms in the U.S. between 1992 and 2006 (excluding 2001) with financial data from Compustat, price/volume data from CRSP, executive compensation data from Execucomp, Market Volatility Index data from the Chicago Board Options Exchange (CBOE) website, and macroeconomic data are from the U.S. Department of Labor and Commerce website. The table reports descriptive statistics for the variables used in the regression analyses. All variables are defined as before.

Table 4.3 reports correlations of the key variables used in the regression analyses. Pearson correlations are presented above the diagonal and Spearman rank correlations are presented below the diagonal. There is a positive correlation between STP and SMOOTH. The positive correlation suggests that firms engage in more income smoothing activity as the sensitivity of managers' wealth to stock price increases. There is also a positive association between return on assets (ROA) and income smoothing (SMOOTH). The positive and significant correlation indicates that higher firm performance is related to more income smoothing. The positive association between SIZE and STP suggests that firm size is a driving force for stock and option value sensitivity to stock price.

Although the correlations among some of the explanatory variables are generally significant, the regression analyses in this study do not suffer from problems due to multicollinearity, based on standard diagnostic checks (Belsley et al. 1980, Karuna 2007).

Table 4.3: *Correlations between Variables Used in Regression Analyses*

VAR	SMOOTH	POST	VIX	CLASS	STP	LEV	ROA	BTM	SIZE	TIMEY
SMOOTH		0.015**	-0.053†	0.005†	-0.0082†	-0.020†	0.035†	-0.008†	-0.023†	-0.034†
POST	0.038†		-0.256†		0.123†	-0.058†	-0.092†	0.032†	0.053†	0.869†
VIX	-0.035†	-0.256		-0.267†	-0.000	0.064†	-0.068†	0.044†	-0.087†	0.055†
CLASS	0.002**		-0.212†		0.048†	0.022†	0.022†	-0.037†	0.103†	0.258†
STP	0.001	0113†	0.005**	0.051†		-0.089†	0.266†	-0.314†	0.587†	-0.036†
LEV	-0.019†	-0,049†	0.062†	0.028†	-0.086†		-0.166†	0.076†	0.021†	0.033†
ROA	0.055†	-0,082†	-0.054†	0.041†	0.226†	-0.309†		-0.436†	0.309†	0.110†
BTM	0.004*	-0.003†	0.035†	-0.035†	-0.165†	-0.037†	-0.019†		-0.429†	-0.064†
SIZE	-0.000	0.046†	-0.088†	0.105†	0.582†	-0.008†	0.346†	-0.241†		-0.015†
TIMEY	-0.063†	0.892†	-0.267†	0.265†	0.140†	-0.049†	-0.015†	0.047†	-0.368†	

The table reports the values of the correlation between each variables used in the main analysis. Spearman (Pearson) correlations are above (below) the diagonal. All variables are defined as before. †, **, and * denote two-tailed significance at the 1% , 5%, and 10% level, respectively.

4.5.3 SFAS 133 and earnings volatility

Before presenting the main results of this chapter, I provide some evidence on the impact of SFAS 133 on unmanaged earnings volatility. To provide the evidence, I regress the unmanaged earnings volatility measure (UNME-V) on POST and other several control variables listed in equation 4.3. The results reported in Table 4.4 show that unmanaged earnings volatility is significantly higher after the adoption of SFAS 133 than before. Specifically, the coefficient on POST is 0.2629 (t = 2.99). This indicates that SFAS 133 indeed induces unmanaged earnings volatility by requiring firms to report the gains and losses resulting from the changes in the fair value of derivative instruments in the income statement immediately, but gains and losses of the hedged items later. This implies that because earnings volatility is costly for managers and shareholders, managers engage in earnings smoothing to reduce the volatility induced by SFAS 133. This is consistent with Zhang's (2009) empirical finding that there is no significant change in managed earnings volatility after the adoption of SFAS 133.

Table 4.4: *Accounting for Derivatives and unmanaged earnings volatility*

		Dependent variable	
		UNME-V	
Variables	Predicted sign	I	II
POST	+	0.2629***	0.4082***
		(2.99)	(4.42)
VIX	+	0.0045	-0.0024
		(1.29)	(-0.65)
STP	-	0.0031	0.1989***
		(0.19)	(7.57)
LEV	±	0.5533***	1.3555***
		(4.52)	(5.16)
ROA	±	-0.4561***	2.0103***
		(-2.63)	(7.72)
BTM	±	0.4468***	0.1658*
		(8.43)	(2.05)
SIZE	±	-0.0766***	-0.5553***
		(-4.70)	(-11.93)
TIMEY	±	0.0236*	0.0311*
		(1.93)	(2.24)
Intercept	±	0.2956*	
		(1.75)	
Firm-fixed-effects			Yes
No. of observations		215,984	215,984
R^2		0.1%	9%

The table reports regression coefficient estimates and (in parentheses) t-statistics. Firm-fixed-effects are included in the regression reported in columns II of the table. UNME-V is the standard deviation of unmanaged earnings (i.e., net income minus discretionary accruals) scaled by total assets. All other variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

4.6 Main results

4.6.1 SFAS 133 and income smoothing

Table 4.5 reports the regression results for equation (4.3), examining the changes in income smoothing via discretionary accruals after the implementation of SFAS 133. Column I of Table 4.5 presents the results without including firm dummies in the regression. The estimated coefficient on POST, representing the change in income smoothing via discretionary accruals between the pre-SFAS 133 and post-SFAS 133 period, is positive and significant (α_1 = 0.3586; t = 42.76). After including firm dummies in the regression, the results reported in Column II of Table 4.5 show that the estimated coefficient on POST is also positive and significant (α_1= 0.3942; t = 47.26). Consistent with my first hypothesis, the results reported in Table 4.5 show

that the level of income smoothing via discretionary accruals is significantly higher after the adoption of SFAS 133.

The estimated coefficients on the control variables are generally consistent with my predictions. Larger firms, firms with higher leverage, and firms with higher BTM ratio tend to engage in less income smoothing via discretionary accruals activities. Moreover, larger stock and option value sensitivity to a percentage change to stock price and firms with better performance are likely to engage in more income smoothing. I find a significant negative association between the time trend control variable (TIMEY) and income smoothing (SMOOTH), suggesting that the increase in income smoothing via discretionary accruals in the post-SFAS 133 period is not due to a trend but to the adoption of SFAS 133.

Taken together, the results reported in Column I and II of Table 4.5 generally support my first hypothesis that after the adoption of SFAS 133, firms engaged in more income smoothing via discretionary accruals to mitigate the potential cost of higher earnings volatility imposed by SFAS 133.

Table 4.5: *Accounting for Derivatives and Income Smoothing*

Dependent variable: SMOOTH			
Variables	Predicted sign	I	II
POST	+	0.3586***	0.3942***
		(42.76)	(47.44)
VIX	±	-0.0062***	-0.0054***
		(-18.61)	(-16.64)
STP	+	0.0106***	0.0135***
		(7.02)	(5.72)
LEV	-	-0.0364***	0.0225
		(-3.12)	(0.96)
ROA	+	0.4428***	0.3676***
		(26.71)	(15.69)
BTM	-	-0.0047	0.0075
		(-0.92)	(1.04)
SIZE	-	-0.0192***	0.0192***
		(-12.34)	(4.54)
TIMEY	±	-0.0624***	-0.0803***
		(-53.22)	(-64.44)
INTERCEPT	±	0.7106***	
		(44.09)	
Firm-fixed-effects			Yes
Observations		215,984	215,984
R^2		2%	20%

The table reports regression coefficient estimates and (in parentheses) t-statistics. All variables are defined as before. Firm-fixed-effects are included in in the regression reported in Column II of the table. ***, **, and * denote two-tailed significance at the 1% , 5%, and 10% level, respectively.

4.6.2 SFAS 133, type of hedgers, and income smoothing

Table 4.6 presents the regression results for equation (4.4) based on only the post-SFAS 133 period sample, which consists of 109,192 firm-year observations. The estimated coefficient on CLASS, representing the difference between income smoothing via discretionary accruals for ineffective hedgers and income smoothing via discretionary accruals for effective hedgers after the adoption of SFAS 133, is positive and significant ($\beta_1 = 0.0680$; t = 5.84). After including firm dummies in the regression, the results reported in Column II of Table 4.6 show that the estimated coefficient on CLASS is still positive and significant ($\beta_1 = 0.0413$; t = 3.13). This finding indicates that ineffective hedgers engage in more earnings smoothing via discretionary accruals than effective hedgers after the implementation of SFAS 133. The estimated coefficients on the control variables are generally consistent with my predictions.

In sum, consistent with my second hypothesis, I find that income smoothing via discretionary accruals is higher for ineffective hedgers than effective hedgers after the adoption of SFAS 133. This implies that SFAS 133 has a larger influence on ineffective

hedgers than on effective hedgers.

Table 4.6: *Hedge Effectiveness and Income Smoothing*

Dependent variable: SMOOTH			
Variables	Predicted sign	I	II
CLASS	+	0.0680***	0.0413***
		(5.84)	(3.13)
VIX	±	-0.0100***	-0.0077***
		(-11.05)	(-9.31)
STP	+	0.0185**	0.0577***
		(8.15)	(14.05)
LEV	-	-0.0289*	-0.2188***
		(-1.80)	(-5.45)
ROA	+	0.4103***	0.1694***
		(19.35)	(5.60)
BTM	-	-0.0350***	-0.0827***
		(-5.27)	(-7.00)
SIZE	-	-0.0145***	0.0300***
		(-6.25)	(3.85)
TIMEY	±	-0.0100***	-0.1012***
		(-11.05)	(-25.88)
INTERCEPT	±	4.4301***	
		(3.88)	
Firm-fixed-effects			Yes
Observations		109,192	109,192
R^2		1%	32%

The table reports regression coefficient estimates and (in parentheses) t-statistics. All variables are defined as before. Firm-fixed-effects are included in the regression reported in column II of the table. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

4.6.3 SFAS 133, market volatility, and income smoothing

Table 4.7, reports the regression results for equation (4.5). The estimated coefficient on VIX is negative and significant (α_2 = -0.0097; t = -9.71). When I interact the market instability measure (VIX) with POST, estimating the impact of market instability on the effect of SAFS 133 on income smoothing via discretionary accruals, the coefficient on the interaction term (VIX*POST) is positive and significant (α_3 = 0.0057; t = 3.77). After including firm dummies in the regression, the coefficient on the interaction term (VIX*POST) is still positive and significant (α_3 = 0.0058; t = 4.04). The results in Table 4.7 therefore support my third hypothesis that the higher market instability, the higher income smoothing via discretionary accruals after the adoption of SFAS 133.

Table 4.7: *SFAS 133, Income Smoothing and Market Instability*

Dependent variable: SMOOTH			
Variables	Predicted sign	I	II
POST	+	0.1884***	0.2204***
		(4.10)	(5.03)
VIX	±	-0.0097***	-0.0091***
		(-9.71)	(-9.45)
VIX*POST	+	0.0057***	0.0058***
		(3.77)	(4.04)
STP	+	0.0105***	0.0133***
		(6.97)	(5.65)
LEV	-	-0.0364***	0.0210
		(-3.12)	(0.89)
ROA	+	0.4431***	0.3674***
		(26.73)	(15.69)
BTM	-	-0.0057	0.0055
		(-1.12)	(0.75)
SIZE	-	-0.0191***	0.0021***
		(-12.29)	(4.94)
TIMEY	±	-0.0537***	-0.0714***
		(-20.71)	(-28.32)
INTERCEPT	±	0.7170***	
		(44.24)	
Fixed-fixed-effects			Yes
Observations		215,984	215,984
R^2		2%	20%

The table reports regression coefficient estimates and (in parentheses) t-statistics. All variables are defined as before. Fixed-fixed-effects are included in the regression reported in Column II of the table. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

4.6.4 Sensitivity tests

I performed additional tests to examine the robustness of my results. First, because non-financial firms use derivative instruments more for hedging rather than for speculation, I examined whether my results are robust after excluding financial firms from my sample. The results reported in Columns I, II and III of Table 4.8 show that the coefficients on POST, CLASS and POST*VIX are positive and significant, specifically on POST ($\alpha_1 = 0.3619$; t = 41.69), CLASS ($\beta_1 = 0.0546$; t = 4.19) and POST*VIX ($\alpha_3 = 0.0078$; t = 4.98). After including firm dummies in the regression, the results reported in Columns I, II and III of Table 4.8, the coefficients on POST, CLASS and POST*VIX are still positive and significant, specifically POST ($\alpha_1 = 0.4047$; t = 47.14), CLASS ($\beta_1 = 0.0686$; t = 5.24) and POST*VIX ($\alpha_3 = 0.0083$; t = 5.60). Thus, the results continue to show that there is a significant increase in income smoothing after the adoption of SFAS 133, and that ineffective hedgers engage in

more income smoothing than effective hedgers. Moreover, the findings indicate that the higher market instability, the higher income smoothing via discretionary accruals after the adoption of SFAS 133.

Table 4.8: *Accounting for Derivatives and Income Smoothing - only for Non-financial Firms*

Dependent variable: SMOOTH				
Variables	Predicted sign	I	II	III
POST	+	0.3619***		0.1291***
		(41.69)		(2.72)
VIX	±	-0.0057***	-0.0090***	-0.0105***
		(-16.47)	(-9.60)	(-10.15)
POST*VIX	+			0.0078***
				(4.98)
CLASS	+		0.0546***	
			(4.19)	
STP	+	0.0085***	0.0134**	0.0084***
		(5.32)	(5.63)	(5.26)
LEV	-	-0.0354***	-0.0632	-0.0354***
		(-2.89)	(3.74)	(-2.88)
ROA	+	0.4489***	0.3966**	0.4495***
		(26.72)	(18.53)	(26.75)
BTM	-	0.0005	-0.0223***	-0.0008
		(0.10)	(-3.25)	(-0.16)
SIZE	-	-0.0201***	-0.0116***	-0.0199***
		(-12.34)	(-4.76)	(-12.29)
TIMEY	±	-0.0614***	-0.0849***	-0.0495***
		(-50.62)	(–19.77)	(-18.47)
INTERCEPT	±	0.6984***	1.3841***	0.7073***
		(41.78)	(17.48)	(42.07)
No. of observations		201,939	101,831	201,939
R^2		2%	1%	2%

The sample comprises observations from only nonfinancial firms in the U.S. between 1992 and 2006. The table reports the estimates from a model examining the effect of SFAS 133 on income smoothing in Column I, whether income smoothing after the adoption of SFAS 133 varies between effective hedgers and ineffective hedgers in Column II, and the impact of market instability on the effect of SFAS 133 on income smoothing in Column III. The table reports regression coefficient estimates and (in parentheses) t-statistics. All variables are as defined before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Table 4.9: *Accounting for Derivatives and Income Smoothing - only for Non-financial Firms*

Dependent variable: SMOOTH				
Variables	Predicted sign	I	II	III
POST	+	0.4047***		0.1562***
		(47.64)		(3.45)
VIX	±	-0.0049***	-0.0980***	-0.0101***
		(-14.51)	(-24.23)	(-10.20)
POST*VIX	+			0.0083***
				(5.60)
CLASS	+		0.0686***	
			(5.24)	
STP	+	0.0149***	0.0511***	0.0146***
		(6.06)	(11.88)	(5.95)
LEV	-	0.0098	-0.2576***	0.0073
		(0.41)	(-6.25)	(0.31)
ROA	+	0.3859***	0.1901***	0.3859***
		(16.35)	(6.25)	(16.35)
BTM	-	0.0090	-0.0740***	0.0063
		(1.22)	(-6.29)	(0.84)
SIZE	-	0.0151***	-0.0238***	0.0174***
		(3.50)	(3.00)	(4.00)
TIMEY	±	-0.0807***	-0.0980***	-0.0680***
		(-62.84)	(-24.23)	(-26.12)
Firm-fixed-effects		Yes	Yes	Yes
No. of observations		201,939	101,831	201,939
R^2		20%	32%	20%

The sample comprises observations from only nonfinancial firms in the U.S. between 1992 and 2006. The table reports the estimates from a model examining the effect of SFAS 133 on income smoothing in Column I, whether income smoothing after the adoption of SFAS 133 varies between effective hedgers and ineffective hedgers in Column II, and the impact of market instability on the effect of SFAS 133 on income smoothing in Column III. The table reports regression coefficient estimates and (in parentheses) t-statistics. Firm-fixed-effects are included in the regression reported in the table. All variables are as defined before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Secondly, I examined whether my results are sensitive for changes in the transition period. Using a fiscal year between 1999 and 2001 as a new transition period, I find consistent results with my main findings. Specifically, the results reported in Column I of Table 4.10 show that the coefficient on POST is positive and significant (γ_1 = 0.4039; t = 46.23). After including firm dummies in the regression, the results reported in Column II of Table 4.10 show that the estimated coefficient on POST is still positive and significant ($\gamma_1 = 0.4412$; t = 51.30).

The results reported in Column III of Table 4.10 show that the estimated coefficient on VIX*POST is positive and significant ($\Theta_3 = 0.0021$; t = 1.73). After including

firm dummies in the regression, the results reported in Column IV of Table 4.10 show that the estimated coefficient on VIX*POST is still positive and significant (Θ_3 = 0.0028; t = 1.93). Overall, the results shown in Table 4.10 are similar to those shown in Table 4.5 and Table 4.7.

Table 4.10: *SFAS 133, Hedge Effectiveness, Earnings Volatility, and Income Smoothing: 1999 to 2001 as a transition period*

Dependent variable: SMOOTH					
Variables	Pred.sign	I	II	III	IV
POST	+	0.4039***	0.4412***	0.3410***	0.3576***
		(46.23)	(51.30)	(7.30)	(8.07)
VIX	±	-0.0071***	-0.0065***	-0.0084***	-0.0083***
		(-21.12)	(-19.72)	(-8.33)	(-8.60)
VIX*POST	+			0.0021*	0.0028*
				(1.73)	(1.93)
STP	+	0.0109***	0.0129***	0.0109**	0.0128***
		(7.18)	(5.38)	(7.16)	(5.35)
LEV	-	-0.0348***	0.0226	-0.0349***	0.0219
		(-2.96)	(0.95)	(-2.95)	(0.92)
ROA	+	0.4386***	0.3485***	0.4386***	0.3486***
		(21.16)	(14.70)	(26.16)	(14.70)
BTM	-	0.0026	0.0223***	-0.0030	0.0213***
		(0.51)	(2.99)	(-0.58)	(2.84)
SIZE	-	-0.0181***	0.0188***	-0.0181***	0.0233***
		(-11.51)	(5.26)	(-11.50)	(5.42)
TIMEY	±	-0.0684***	-0.0862***	-0.0651***	-0.0818***
		(-56.23)	(-67.31)	(-24.42)	(-31.85)
INTERCEPT	±	0.7568***		0.7586	
		(45.96)		(45.92)	
Firm-fixed-effects			Yes		Yes
Observations		211,831	211,831	211,831	211,831
R^2		2%	21%	2%	25%

The table reports regression coefficient estimates and (in parentheses) t-statistics. Between 1999 and 2001 is used as a transition period. Firm-fixed-effects are included in the regression reported in columns II nd VI of the table. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Thirdly, to rule out the possibility of my results being affected by macro-economic and corporate governance factors, I included real GDP growth rate and CEOs participation in compensation committee variables in the models. My findings are not affected by these factors (untabulated). To reduce the influence of other events (e.g., the introduction of SOX) on managers' income smoothing behavior, I use shorter time window (i.e., between 1998 and 2002) to examine the sensitivity of my results. I find results consistent with my main findings.

Fourthly, to ascertain the sensitivity of my results with respect to the proxy for hedge effectiveness, I use an alternative measure for hedge effectiveness. Specifically, I replace CLASS with CLASS-L which is computed as the absolute value of gains and losses due to hedge ineffectiveness scaled by total assets.[6]

Table 4.11 presents the sensitivity test using CLASS-L as an alternative proxy for the level of hedge effectiveness. The results provided in Table 4.11 are still consistent with my main findings. Specifically, the coefficient on CLASS-L is positive and significant. After including firm dummies in the regression, the results presented in II of Table 4.11 show that the coefficient on CLASS-L is still positive. Thus, the results reported in Table 4.11 continue to show that the higher the degree of hedge ineffectiveness, the higher income smoothing after the adoption of SFAS 133.

Fifthly, to ascertain the sensitivity of my results with respect to the income smoothing measure, I employed an alternative measure of income smoothing. Like prior studies (e.g., Leuz et al. 2003; Tucker and Zarowin 2006 and Grant et al. 2009), I used the ratio of the variability of earnings to the variability of cash flows as an alternative measure of income smoothing (hereafter, SMOOTH2). I measure the variability of earnings by the standard deviation of income before extraordinary items deflated by total assets. Similarly, I measure the variability of cash flows by the standard deviation of quarterly operating cash flows deflated by total assets. Ratios in excess of one indicate more earnings variability relative to the variability of cash flows. The more income smoothing, the less variability of earnings with respect to the variability in cash flows. Like Grant et al. (2009), I calculate SMOOTH2 over a period of three years (12 quarters). In my analyses, I use the inverted sign of SMOOTH2 for ease of interpretation, where larger coefficients indicate higher income smoothing. I find similar results to my main findings (untabulated).

Sixthly, I extended the sample period from 2006 to 2009 to test whether my findings are sensitive to a longer sample period. My results are robust after extending the sample period from 2006 to 2009. The results reported in Table 4.12 show that the coefficients on POST, CLASS and POST*VIX are positive and significant, specifically on POST ($\alpha_1 = 0.1814$; t = 21.89), CLASS ($\beta_1 = 0.0603$; t = 5.79) and VIX*POST ($\alpha_3 = 0.0849$; t = 90.75). After including firm dummies in the regression, the results reported in columns II, IV and VI of Table 4.12 show that the coefficients on POST, CLASS and POST*VIX are still positive and significant, specifically, on POST ($\alpha_1 = 0.2081$; t = 25.40), CLASS ($\beta_1 = 0.0199$; t = 1.80) and VIX*POST ($\alpha_3 = 0.0797$; t = 85.26). Thus, the results continue to show that there is a significant increase in income smoothing after the adoption of SFAS 133, and that ineffective hedgers engage in more income smoothing than effective hedgers. Moreover, the findings indicate that the higher market instability, the higher income smoothing via discretionary accruals after the adoption of SFAS 133.

[6]I use the absolute value of gains or losses due to hedge ineffectiveness because I expect both positive and negative movements of a given magnitude to generate similar level of earnings volatility and thus income smoothing.

Table 4.11: *Hedge Effectiveness and Income Smoothing*

Dependent variable: SMOOTH			
Variables	Predicted sign	I	II
CLASS-L	+	7.8964**	0.3287
		(2.16)	(0.07)
VIX	±	-0.0098***	-0.0079***
		(-10.08)	(-9.61)
STP	+	0.0184***	0.0573***
		(8.09)	(13.96)
LEV	-	-0.0253	-0.2178***
		(-1.57)	(-5.43)
ROA	+	0.4106***	0.1706***
		(19.35)	(5.64)
BTM	-	-0.0346***	-0.0825***
		(-5.19)	(-6.99)
SIZE	-	-0.0136***	0.0290***
		(-5.89)	(3.72)
TIMEY	±	-0.0846***	-0.1037***
		(-20.63)	(-27.16)
INTERCEPT	±	1.3813***	
		(18.24)	
Firm-fixed-effects			Yes
Observations		109,190	109,190
R^2		1%	32%

The sample comprises of 109,192 (i.e., only post-SFAS 133 period) firm-year observations from financial and nonfinancial firms in the U.S. between 2002 and 2006. The table reports results for the impact of hedge effectiveness on income smoothing using post-SFAS 133 sample. The table reports regression coefficient estimates and (in parentheses) t-statistics. Firm-fixed-effects are included in the regression reported in Column II of the table. All variables are defined as before. ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Table 4.12: *SFAS 133, Hedge Effectiveness, Earnings Volatility, and Income Smoothing*

	Dependent variable: SMOOTH						
Variables	Pred.sign	I	II	III	IV	V	VI
POST	+	0.1814***	0.2081***			2.270***	2.0969***
		(21.89)	(25.40)			(80.00)	(74.83)
CLASS	+			0.0603***	0.0199*		
				(5.79)	(1.80)		
VIX	±	0.0059***	0.0061***	0.0323***	0.0320***	-0.0562***	-0.0525***
		(19.70)	(21.10)	(82.11)	(85.59)	(-75.06)	(-70.41)
VIX*POST	+					0.0848***	0.0797***
						(90.20)	(85.26)
STP	+	-0.0013	-0.0134***	0.0085***	0.0005	0.0039**	-0.0058***
		(-0.92)	(-5.94)	(4.05)	(0.17)	(2.73)	(-2.60)
LEV	-	0.0406***	0.0274***	0.0304***	0.0009	0.0363***	0.0216***
		(11.71)	(7.68)	(8.56)	(0.26)	(10.68)	(6.17)
ROA	+	0.3204***	0.1702***	0.2289***	-0.0038	0.3118***	0.1656***
		(22.84)	(9.77)	(14.33)	(-0.20)	(22.62)	(9.66)
BTM	-	0.0000*	0.0149***	0.0000	-0.0061**	0.0000	-0.0007
		(1.79)	(4.73)	(1.26)	(-1.99)	(1.26)	(-0.26)
SIZE	-	-0.0143***	0.0188***	-0.0042**	0.0787***	-0.0133***	0.0473***
		(-9.52)	(4.89)	(-1.97)	(12.90)	(-9.00)	(12.42)
TIMEY	±	-0.0150***	-0.0322***	-0.1093***	-0.1223***	-0.0902***	-0.0665***
		(-13.50)	(-27.38)	(-66.52)	(-57.60)	(-56.38)	(-40.68)
INTERCEPT	±	4.4301***		-2.4092***		0.0536***	
		(3.88)		(35.92)		(-69.07)	
Firm-fixed-effects			Yes		Yes		Yes
Observations		226,208	226,208	119,414	119,414	226,208	226,208
R^2		1%	18.5%	6%	33%	4%	21%

The table reports regression coefficient estimates and (in parentheses) t-statistics. The sample period is extended to 2009. All variables are defined as before. Firm-fixed-effects are included in the regression reported in columns II, IV, and VI of the table. Columns I and II are based on equation 4.3 (i.e, to test hypothesis 1), columns III and IV are based on equation 4.4 (i.e, to test hypothesis 2) and columns V and VI are based on equation 4.5 (i.e, to test hypothesis 3). ***, **, and * denote two-tailed significance at the 1%, 5%, and 10% levels, respectively.

Finally, prior studies (e.g., Petersen 2009) suggest that in regression analyses with panel data, the residuals may be correlated across firms and across time, and OLS standard errors can be biased. To adjust the standard errors for residual correlation (both within firms over time, and across firms each time period), Petersen (2009) suggests to estimate the standard errors with clustering along multiple dimensions (firm and year). As my sample comprises panel data, I test whether my results are sensitive for residual correlation. Using the approach discussed by Petersen 2009, I estimate the standard errors with clustering along multiple dimensions (firm and year). Untabulated results generally support the findings of this study.

4.7 Summary and conclusion

SFAS 133 requires firms to report all derivative instruments on the balance sheet at fair value, and the gains or losses resulting from the changes in fair value must be recorded in earnings and/or as a component of other comprehensive income. SFAS 133 is a widely debated and controversial accounting standard for derivative instruments. This study investigates whether the implementation of SFAS 133 influences income smoothing. First, I hypothesize that income smoothing via discretionary accruals increases after the adoption of SFAS 133. Second, I predict that ineffective hedgers engage in more income smoothing than effective hedgers after the adoption of SFAS 133. Third, I expect that income smoothing via discretionary accruals after the adoption of SFAS 133 increases more with market instability. Like prior studies (e.g., Leuz et al. 2003; Tucker and Zarowin 2006; Grant et al. 2009), I used the correlation between changes in managed earnings and changes in unmanaged earnings as a measure of income smoothing. Consistent with my predictions, I find that income smoothing via discretionary accruals increases significantly after the adoption of SFAS 133, suggesting that SFAS 133 unintentionally leads firms to engage in more income smoothing via discretionary accruals activity. I also show that ineffective hedgers engage in more income smoothing via discretionary accruals than effective hedgers after the adoption of SFAS 133. Lastly, I find that the higher market volatility, the stronger income smoothing via discretionary accruals after the adoption of SFAS 133, suggesting that larger fluctuations in the fair value of derivative instruments causes higher earnings volatility and thus higher income smoothing.

My findings contribute not only to the accounting literature by empirically showing that SFAS 133 affects income smoothing, but also to the general debate about whether SFAS 133 affects earnings volatility. Taken together, my findings indicate that firms smooth earnings via discretionary accruals to mitigate the earnings volatility imposed by SFAS 133. Thus, the empirical evidence of this study confirms the claims of critics and managerial concerns about the effect of SFAS 133 on earnings volatility and income smoothing. Therefore, standard setters and regulators should take into account the trade-off between increasing transparency and income smoothing.

5

Conclusion

Statement of Financial Accounting Standards 133 (SFAS 133), *Accounting for Derivative Instruments and Hedging Activities*, deals with controversial and critical issues, such as fair value accounting, hedge accounting, hedge effectiveness testing and measurement, documentation and disclosure. Although SFAS 133 is a comprehensive accounting standard for derivatives, it is one of the most controversial standards ever issued by the FASB. This dissertation examined the economic consequences of the implementation of SFAS 133.

The three studies in this dissertation contribute towards a better understanding of the various consequences of the adoption of SFAS 133. More specifically, it contributes to the literature on the costs and benefits of mandatory accounting recognition and disclosure regulations, by addressing the consequences of SFAS 133 from both investors' and managers' perspectives. The findings not only contribute to the academic literature, but also have important implications for standard setters and regulators in the US, as well as for standard setters and regulators in other countries who are concerned with recognition and disclosure of derivative instruments and hedging activities (e.g., IASB). This chapter provides a summary of the findings of each study, their implications for standard setters and regulators, and their limitations. The dissertation concludes by considering potential areas for future research.

5.1 Summary of results and limitations

The first study, presented in chapter two, empirically examined the impact of derivative instruments recognition and disclosure under SFAS 133 on investors' uncertainty

about the cash flow implications of changes in foreign currency exchange rates. Moreover, this chapter investigated the influence of product market competition on the impact of SFAS 133 on investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates. The findings of chapter two indicate that the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 increases transparency about the risks associated with derivative instruments and hedging activities and thus helps investors to better predict the cash flow implications of changes in foreign currency exchange rates. More specifically, the results show that investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is lower after the implementation of SFAS 133. Although SFAS 133 is a controversial accounting standard for derivatives and hedging instruments, the empirical evidence of this chapter confirms that SFAS 133 increases the visibility and comparability of the risks associated with derivatives, reduces off-balance-sheet transactions and gives a more detailed picture of the risk situations by requiring firms to report all derivative instruments on the balance sheet at fair value. Chapter two further shows that the proprietary costs associated with derivatives and hedging activities affect firms' recognition and disclosure decisions and thus reduces the usefulness of SFAS 133 to investors. More specifically, I find that when the level of product market competition increases, the decrease in investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates after the implementation of SFAS 133 is weaker. This confirms anecdotal evidence that some firms strategically recognize and/or disclose their derivative instruments and hedging activities to protect their proprietary information.

The second study, presented in chapter three, analyzes the role of the quality of accounting recognition and disclosure on investors' responses to macro-economic news. Specifically, I investigated whether the adoption of SFAS 133 affects investors' reaction to good and bad interest rate news. The results of chapter three show that investors respond asymmetrically to good and bad interest rates news. However, the asymmetry is less pronounced after the implementation of SFAS 133. Specifically, I find that investors respond asymmetrically to good and bad interest rate news in both the pre and post-SFAS 133 period, but the asymmetry significantly decreases after the implementation of SFAS 133. This is consistent with idea that when investors receive an ambiguous signal which conveys good or bad news, investors take bad news more seriously, while discounting good news. However, investors discount good news less heavily when the quality of accounting recognition and disclosure is higher. I also find that the asymmetry of responses to good and bad interest rate news before the adoption of SFAS 133 are greater for firms with higher earnings volatility than for firms with lower earnings volatility. This implies that uncertainty about the precision of information for firms with higher earnings volatility is higher than for firms with lower earnings volatility. Chapter three further shows that the decrease in the asymmetric responses to good and bad interest rates after the adoption of SFAS

1333 is significantly higher for firms with higher earnings volatility than for firms with lower earnings volatility. This indicates that information quality is more relevant for firms with higher earnings volatility than for firms with lower earnings volatility.

Whereas chapters two and three study the usefulness of SFAS 133 from investors' perspective, chapter four considers the effect of SFAS 133 on managers' income smoothing behaviour. More specifically, the third study investigates whether the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 have an impact on income smoothing. Moreover, the study examines whether the degree of hedge ineffectiveness and market instability affect the impact of SFAS 133 on income smoothing. Prior to the adoption of SFAS 133, derivative instruments' gains and losses were incorporated in the carrying value of the assets or liabilities, or deferred and recorded at the time earnings were recognized on the assets or liabilities. However, under SFAS 133, derivative instruments' gains and losses are recognized in earnings in the period that they occur, but gains and losses on the hedged item are recognized later. This hedge mismatch has induced higher earnings volatility in the post-SFAS 133 period. Because earnings volatility is costly to managers and investors, I expect income smoothing to be higher in the post-SFAS 133 period. Moreover, because ineffective hedgers are less likely to qualify for hedge accounting, I predict that ineffective hedgers will engage more in income smoothing than effective hedgers. I also predict that the higher the market instability, the stronger the income smoothing via discretionary accruals after the adoption of SFAS 133 because larger market instability makes it more difficult for firms to apply hedge accounting. In line with the predictions, the results indicate that income smoothing via discretionary accruals is higher after the implementation of SFAS 133. Additionally, ineffective hedgers engage in more income smoothing via discretionary accruals than effective hedgers. Finally, the results indicate that the higher the market instability, the stronger the income smoothing via discretionary accruals after the implementation of SFAS 133. The results in this chapter thus confirm the claims of critics and managerial concerns about the impact of SFAS 133 on earnings volatility and income smoothing.

Although sensitivity tests indicate that the results reported in this dissertation are robust to different specifications of tests, a number of caveats need to be noted regarding the present studies. The most important limitation of the results presented in chapter two is that the proxy for investors' uncertainty about the cash flow implications of changes in foreign currency exchange rates is noisy. Researchers use several proxies for information asymmetry, including trading volume (e.g., Linsmeier et al. 2002) and metrics based on analysts' forecast (e.g., Barron et al. 1998). However, each approach has its limitations. Bid-ask spreads used in this study have been widely adopted in prior studies.

In chapter three, I used the application of SFAS 133 as a proxy for quality of accounting recognition and disclosure because expanded disclosures and mandatory recognition of derivative instruments as assets or liabilities at fair values after SFAS

No. 133 provide greater transparency. However, I cannot rule out the possibility that other factors may have influenced my results. I therefore included several control variables (including macro-economic factors) to mitigate this problem. The difficulty in accurately measuring good and bad interest rate news is another limitation of this study.

One of the limitations of the findings in chapter four is to precisely classify firms into either effective hedgers or ineffective hedgers. I employed the amount of gains or losses due to derivative ineffectiveness as an alternative proxy for the degree of hedge ineffectiveness to mitigate the classification problem. This proxy left me with a small percentage of ineffective hedgers. Non-hedgers could also be considered as effective hedgers. So, I cannot rule out the possibility that this may have influenced my results. Another limitation of chapter four is the difficulty to directly measure the extent or amount of income smoothing in firms, which is common to all empirical research on the topic. Since it is difficult to precisely measure income smoothing using publicly available data, measurement error is unavoidable.

Despite the above stated limitations, the findings of the three studies provide useful insights about the benefits and costs of derivative instruments and hedging activities recognition and disclosure of under SFAS 133. The following section describes a few avenues for future research that follow directly from this dissertation.

5.2 Implications and recommendations for future research

The Statement of Financial Accounting Standards No. 133 (SFAS 133), intended to improve transparency with respect to derivatives instruments by requiring all firms to report their derivative instruments as assets and liabilities and to measure them at fair value, has both potential costs and benefits.

One of the most important benefits of derivative instruments recognition and disclosure under SFAS 133 is that it provides additional useful information to investors to better predict the future cash flows. This confirms the claims of proponents of the benefits of SFAS 133. For example, it confirms that the Financial Accounting Standards Board has achieved the objective of promoting the visibility, comparability, and understandability of the risks associated with derivative instruments. However, this benefit is mitigated by market forces such as product market competition. Specifically, the proprietary costs associated with derivative instruments are higher for firms operating in competitive industries than for operating in less competitive industries. Considering these costs, these firms could have incentives to not fully comply with SFAS 133.

Although derivative instruments recognition and disclosure under SFAS 133 increases transparency, it also induces earnings volatility because it unintentionally induces earnings volatility. Consequently, managers engage in more income smoothing

activities to avoid the costs of earnings volatility.

The findings of these studies have a number of important implications for future practice. Parties that would benefit from these insights include not only academic scholars but also standard setters and regulators.

The study in chapter two stressed that the standard improves transparency about the risks associated with derivative instruments and hedging activities and reduces information asymmetry among investors due to changes in foreign currency exchange rates. However, the proprietary costs associated with derivative instruments and hedging activities reduce the effectiveness of SFAS 133. Hence, standard setters should take product market competition into consideration before making derivative instruments and hedging activities recognition and disclosure mandatory for all firms. By taking product market competition into account, standard setters can get a better view of the costs and benefits, which should help them in making more informed trade-offs.

The study presented in chapter three shows that investors' responses to good and bad interest rate news is less asymmetric after the implementation of SFAS 133. Moreover, it shows that earnings volatility affects the impact of the quality of accounting recognition and disclosure on investors' responses to good and bad macro-economic news. Specifically, the higher the level of earnings volatility, the higher the decrease in the asymmetric investors' responses to good and bad interest rate news. One of the implications of these findings is that managers can influence investors' responses not only to firm-specific news but also to macro-economic news via accounting recognition and disclosure. Another implication is that managers need to consider the level of firms' earnings volatility in order to influence investors' responses to macro-economic news via firms' reporting practices. The findings of this study also help standard setters and regulators to better understand the incentives of firms derivative and hedging activities recognition and disclosure practices.

Chapter four of this dissertation documents the unintended consequences of SFAS 133 adoption. More specifically, firms engage in more income smoothing to reduce the cost of earnings volatility imposed by SFAS 133. This finding underlines that standard setters and regulators should consider the trade-off between increasing transparency and income smoothing. An understanding of this trade-off helps standard setters in setting an optimal derivative instruments and hedging activities recognition and disclosure standard. Another important practical implication of these studies is that factors such as economic, political, and cultural settings should be taken into consideration before implementing the convergence of U.S GAAP and international accounting standards. As the Financial Accounting Standards Board (FASB) continues its convergence activities with the International Accounting Standards Board (IASB), addressing country specific factors that play important role in the application of derivative instruments and hedging activities recognition and disclosure may be useful in deliberations for improved standards, and to mitigate concerns about the

increased time and effort necessary for the application of IFRS.

This dissertation has thus thrown up a number of interesting questions in need of further investigation. The findings of the three studies presented in this dissertation indicate that the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 appear successful in improving transparency and monitoring of the risk implications of derivative instruments and hedging activities. In addition they provide the following suggestions for future research. First, it would be interesting to assess the effectiveness of other countries' accounting standards for derivative instruments and hedging activities (e.g., IAS 39) that include different features. For example, the FASB and the International Accounting Standards (IASB) are working hard to converge U.S GAAP and international accounting standards. In this context, it is worth examining how investors and firms operating in varying economic, political and cultural settings would respond to a single set of accounting standards for derivatives and hedging activities. Second, prior studies indicate that more complete and transparent accounting information increases analysts' information acquisition and use (e.g., Hirst et al. 2004). Thus, further research might explore whether the recognition and disclosure of derivative instruments and hedging activities under SFAS 133 affects analysts' judgments of firm risk and value. Third, future research may examine how analysts use and evaluate the unrealized gains and losses reported in income statements after the implementation of SFAS 133 in order to get insights about the impact of SFAS 133 from the analysts' perspective.

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Appendix: Derivatives recognition and disclosure from 10-K reports

From the 1995 Annual Report of General Motors, Inc.:

The primary classes of derivatives used by General Motors are foreign exchange-forward contracts and options, interest rate forward contracts and options, and forward contracts to purchase or sell mortgages or mortgage-backed securities. General Motors uses foreign exchange-forward contracts as well as purchased and written foreign exchange options.

At December 31, 1995 and 1994, General Motors held foreign exchange-forward contracts of approximately $11,602 million and $9,030 million (including cross-currency swaps of $1,290 million and $1,161 million), respectively. At December 31, 1995 and 1994, General Motors had entered into foreign exchange options of approximately $3,833 million and $2,637 million, respectively.

At December 31, 1995 and 1994, the total notional amount of interest rate forward contracts with off-balance-sheet risk was approximately $15,942 million and $14,080 million, respectively. Gains and losses on terminated interest rate forward contracts are deferred and recognized as a yield adjustment on the underlying debt. Unamortized net losses on interest rate forward contracts totaled approximately $36 million and $24 million at December 31, 1995 and 1994, respectively.

From the 2008 Annual Report of Eurobankshares, Inc.:

The company's objective in using derivatives is to manage interest rate exposure of the variable commercial loan portfolio and other identified risks. To accomplish

this objective, the company primarily uses interest rate swaps as part of its fair value hedging strategy. As of December 31, 2008 and 2007, the company had the following derivative instruments outstanding:

Eurobankshares, Inc. and Subsidiaries
Notes to Consolidated Financial Statements
December 31, 2008 and 2007

	2008		2007	
	Notional amount	Fair value	Notional amount	Fair value
Labour-rate interest rate swaps	14,0000,000	12,959	30,800,000	(415,176)
Purchased Options	25,000,000	110,000	25,000,000	3,950,000
Written Options	25,000,000	110,000	25,000,000	(3,950,000)

During the years ended December 31, 2008 and 2007, the net loss from fair value hedging ineffectiveness was considered inconsequential and reported within other non-interest income. Derivatives instruments were recorded on the balance sheet at their respective fair value.....Follwing are the carrying amount and fair value of financial instruments as of December 31:

Eurobankshares, Inc. and Subsidiaries
Notes to Consolidated Financial Statements
December 31, 2008 and 2007

	2008		2009	
	Carrying amount	Fair value	Carrying amount	Fair value
Financial assets:				
Derivatives-Purchased Options	110,000	110,000	3,950,000	3,950,000
Financial liabilities:				
Derivatives-Interest rate Swaps	12,959	12,959	415,176	415,176
Derivatives-Written Options	100,000	110,000	3,950,000	3,950,000

From the 2007 Annual Report of Citigroup, Inc.:

In the ordinary course of business, Citigroup enters into various types of derivative transactions. These derivative transactions include: futures and forward contracts, swap contracts, and option contracts.

The following table provides data on the notional amount and market values of various types of derivative instruments.

Notional Amount (*in millions of dollar*)	Trading derivatives	Assets/Liability hedges
As of December 31	2007	2007
Interest rate contracts		
Swaps	16,433,117	521,783
Future and forwards	1,811,599	176,146
Written options	3,479,071	16,741
Purchase options	3,639,075	167,080
Total interest rate contract notions	25,362,862	881,750
Foreign exchange contracts		
Swaps	1,062,267	75,622
Future and forwards	2,795,180	46,732
Written options	653,535	292
Purchase options	644,744	686
Total foreign exchange contract notions	5,155,726	123,332
Total derivative notions	35,708,587	1,005,082

Mark-to-Market(*In millions of dollar*)	Der.receivables	Der.payables
As of December 31	2007	2007
Trading Derivatives		
Interest rate contacts	269,400	257,329
Foreign exchange contracts	77,942	71,991
Total	467,209	489,417
Asset/Liablity Management Hedges		
Interest rate contracts	8,529	7,176
Foreign exchange contracts	1,634	972
Total	10,163	8,148

The following table summarizes certain information related to the Company's hedging activities for the years ended December 31, 2007, 2006, and 2005.

In millions of dollar	2007	2006	2005
Fair value hedges			
Hedge ineffectiveness recognized in earnings	91	245	38
Net gains(loss) excluded from assessment of effectiveness	420	302	(32)
Cash flow hedges			
Hedge ineffectiveness recognized in earnings	-	(18)	(18)
Net gains(loss) excluded from assessment of effectiveness	-	-	1

From the 2003 Annual Report of Keycorp, Inc.:

The primary derivatives that Key uses are interest rate swaps, caps and futures, and foreign exchange forward contracts. All foreign exchange forward contracts and interest rate swaps and caps held are over-the-counter instruments. At September 30, 2003, Key had $788 million of derivative assets and $146 million of derivative liabilities on its balance sheet that arose from derivatives that were being used for hedging purposes. As of the same date, derivative assets and liabilities classified as trading derivatives totaled $1.4 billion and $1.3 billion, respectively. Derivative assets and liabilities are recorded at fair value in accrued income and other assets and accrued expense and other liabilities, respectively, on the balance sheet.

Key uses a fair value hedging strategy to modify its exposure to interest rate risk and a cash flow hedging strategy to reduce the potential adverse impact of interest rate increases on future interest expense. For more information about these asset and liability management strategies used to modify Key's exposure to interest rate risk, Key expects to reclassify an estimated $26 million of net gains on derivative instruments from "accumulated other comprehensive income (loss)to earnings during the next twelve months. The following table shows trading income recognized on interest rate swaps and foreign exchange forward contracts.

In millions of dollar	2003	2002
Interest rate swap contracts	6	8
Foreign exchange forward contracts	25	26

From the 2011 Annual Report of Appel, Inc.:

Apple Inc. has used derivative instruments, such as foreign currency forward and option contracts, to hedge certain exposures to fluctuations in foreign currency exchange rates. The Company may enter into foreign currency forward and option contracts with financial institutions to protect against foreign exchange risks associated with certain existing assets and liabilities, certain firmly committed transactions, forecasted future cash flows, and net investments in foreign subsidiaries.

The Company recognized in other income and expense a net loss of $158 million, $123 million and $133 million on foreign currency forward and option contracts not designated as hedging instruments during 2011, 2010 and 2009, respectively. These amounts represent the net gain or loss on the derivative contracts and do not include changes in the related exposures, which generally offset a portion of the gain or loss on the derivative contracts.

The following tables summarize the gross fair value of the Company's derivative instruments as reflected in the Consolidated Balance Sheets as of September 24, 2011 and September 25, 2010 (in millions):

	2011	
	Fair Value: Hedge Inst.	Fair Value: Not-Hedge Inst.
Derivative assets:		
Foreign exchange contracts	460	56
Derivative liabilities:		
Foreign exchange contracts	72	37

The following tables summarize the gross fair value of the Company's derivative instruments as reflected in the Consolidated Balance Sheets as of September 24, 2011 and September 25, 2010 (in millions):

	Gains/(Losses) Recognized in OCI	Ineffective Portion
	2011	2011
Cash flow hedges:		
Foreign exchange contracts	153	(213)
Net investment hedges:		
Foreign exchange contracts	(43)	1
Total	110	(212)

Curriculum Vitae

Abiot Mindaye Tessema was born on the 19th of April 1978 in Bale-Robe, Ethiopia. He attended Robe Comprehensive Secondary High School from 1990 to 1996. From 1996 to 2000 he studied accounting as a major at Addis Ababa University, Ethiopia. In September 2004, he won the Netherlands Organization for International Cooperation in Higher Education (Nuffic) scholarship and joined Masstricht School of Management (MsM) in the Netherlands. He specialized and obtained two MBA degrees in Accounting and Finance and Corporate Strategy and Economic Policy in September 2005, and was named as an outstanding MBA graduate in the 2005/06 academic year. In October 2005, he returned to Ethiopia and resumed teaching at Unity University. In August 2007, he won an ABJ Scholarship and joined Maastricht University Graduate School of Governance in the Netherlands. He specialized and obtained an Msc degree in Public Policy and Human Development in August 2008. He married in 2008 and joined the Department of Accounting and Information Management at Maastricht University as a PhD candidate in the same year. The birth of his cheerful son, Nathan, in June 2010 is one of his happiest moments in Maastricht. In August 2012, he started working in the Department of Accounting at Zayed University in the United Arab Emirates.